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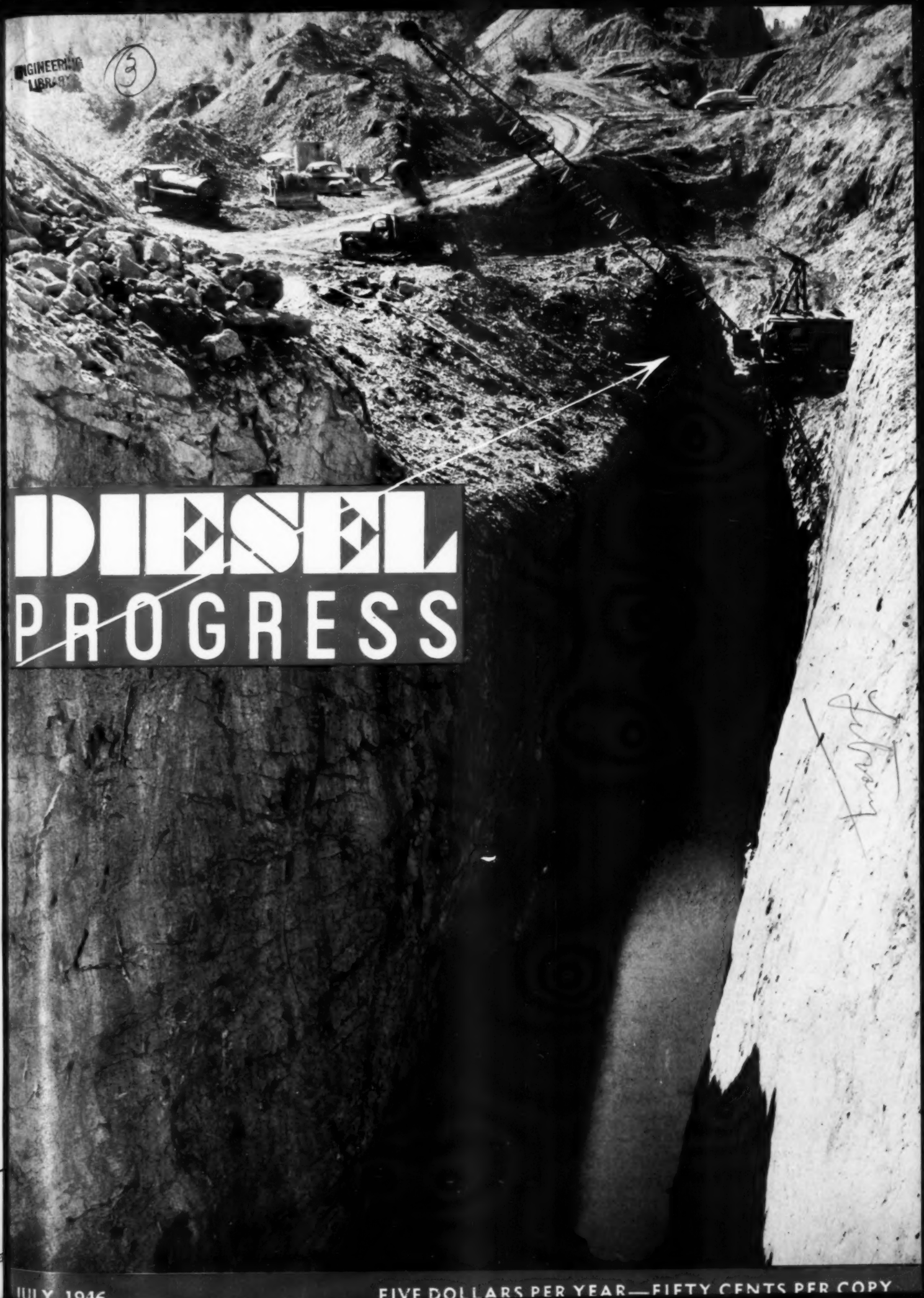

DIESEL PROGRESS

JULY, 1946

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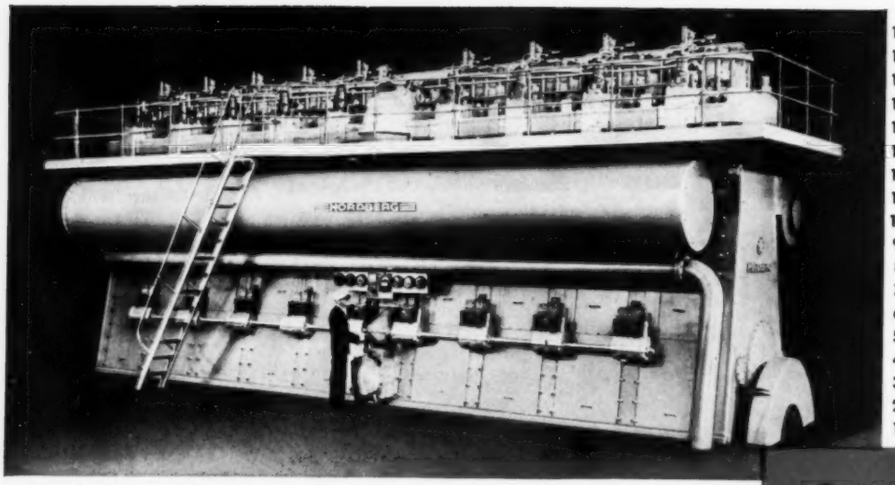

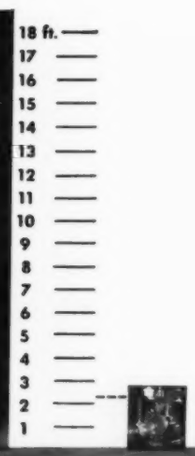

Largest U.S.-built Diesel is the 9-cylinder Nordberg at the left, developing 8000 i.h.p. at 160 r.p.m. This giant has a 29-inch bore and 40-inch stroke, measures 41'4" long and 23'5" high overall, and stands 18'2" from floor to top of engine. Now in operation in U. S. Lines vessel lubricated with Texaco Ursa Oil.

Largest to Smallest

PEAK PERFORMANCE

REGARDLESS of size or type, you'll get peak performance from your Diesels by lubricating with *Texaco Ursa Oils.* These famous oils have been kept in step with Diesel engine developments over the past 30 years. They keep engines clean . . . assuring active valves, free rings, proper seal . . . efficient, full-power operation.

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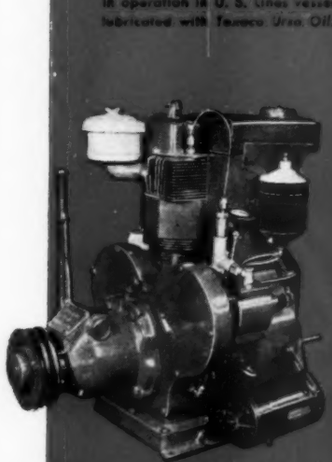

Smallest U.S.-built Diesel is the new, one-cylinder, air-cooled Sheppard, shown above in scale with the Nordberg. It develops 3¾ h.p. at 1800 r.p.m. and has a 3-inch bore and 4-inch stroke. Overall dimensions: 28½" high and 22½" long. L. N. Sheppard Company approves lubrication with Texaco Ursa Oil.

TEXACO

TEXACO Ursa Oils

FOR ALL DIESEL ENGINES

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT—CBS

DIESEL PROGRESS, for July, 1946. Volume XII, Number 7. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 W. Forty-fifth St., New York 19, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at East Stroudsburg, Pa., authorized March 27, 1940. Subscription rates: $5.00 per year, single copy, 50c.

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Art Director

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SHELL DIESEL FUELS

SHELL

THREE DIESEL WORKHORSES SET MAINTENANCE RECORD

FOR over two years and three months, as of April 24, 1946, three General Motors 5400 horsepower freight locomotives have been operating in symbol freight train service on the Baltimore and Ohio railroad daily with 100 per cent availability. One locomotive might set up such a record on an easy assignment and it might be called a combination of luck and careful handling by operating and maintenance crews. But when three locomotives are thrown into such service as these three have faced—and still are facing, without a single failure to mar the performance, it becomes an epic.

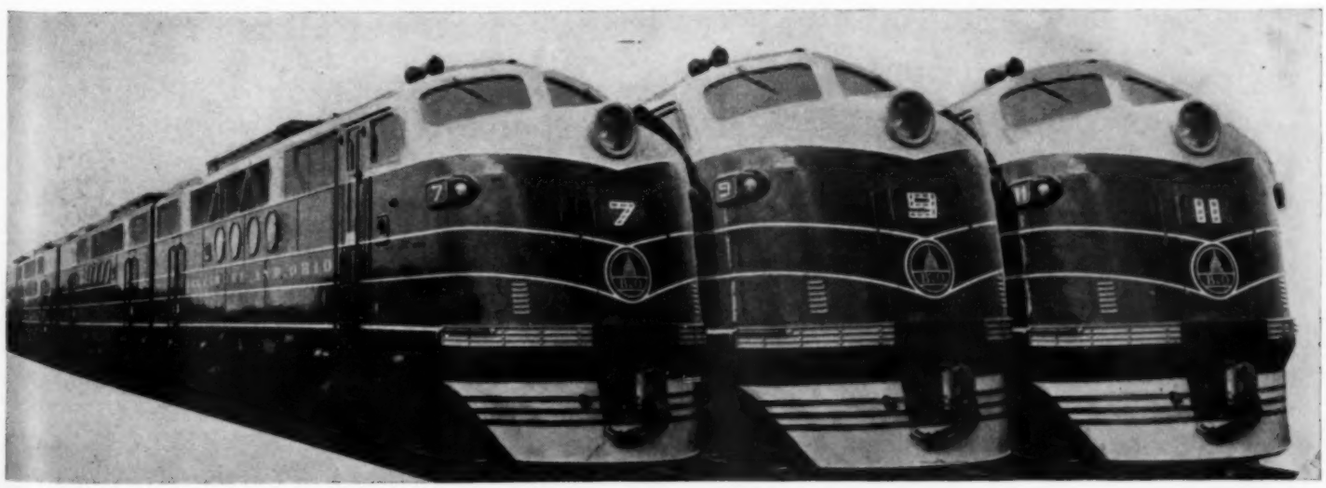
The Baltimore and Ohio Diesel locomotives Nos. 7, 9 and 11 were delivered by Electro-Motive Division of General Motors between August 13 and October 23, 1943. After a variety of preliminary services the three locomotives were assigned to Q.D. Freight trains Nos. 94 and 97 between Cumberland, Maryland, and Washington, Indiana. They have handled these trains daily ever since. The run is an 1136 mile round trip, completed every third day. It embraces some of the toughest Allegheny mountain territory of the B and O system. The period of their service has included over a year of heavy war materiel movement.

Some idea of the terrific continuous grind these locomotives have gone through without a single miss can be gained from the following information upon their assignment: Each pulls a symbol train from Cumberland to Washington, 568 miles. It has an average of two hours for turn around and then is hooked onto another symbol train and starts back to Cumberland, another 568 miles. At Cumberland it has an average layover of six hours and then it starts back west again with another train. In short, during the more than two years that these locomotives have set up this amazing record, they have averaged only six hours, every third day in which maintenance crews could get at them to perform repairs and maintenance operations. None of them has ever broken down on the road.

During the period from August 13, 1943, to April 24, 1946, the three locomotives had accumulated a total of 1,058,000 locomotive miles in fast, rugged freight service. Some further idea of how rugged this service has been also is given by the data on gross ton mile performance. Between January 20, 1944, and January 31, 1946, the locomotives handled the staggering total of 2,663,541,000 gross ton miles without a breakdown.

The record has been so outstanding that recently a dinner was given at Cumberland for the Diesel Maintenance Organization at that point, which was responsible for the maintenance work that had figured in the setting of the two year record. This story points out that Diesel locomotives not only enable railroads to handle more tonnage in faster time than any other form of motive power but that they also do it with a regularity that is simply out of the reach of all other forms of transportation, air, highway or water, and that this is largely made possible because of the inherent advantages possible in a locomotive built around the Diesel engine. The result is, as the Baltimore and Ohio record proves, that it is possible to design motive power than can be maintained and repaired so quickly and easily that everything that has to be done over a period of two years and three months of continuous assignment can be successfully accomplished in a lay-over period averaging only six hours every third day.

The 3 Diesel locomotives which handled 2½ billion ton-miles of freight in 2 years without a breakdown.



FIRST 4-CYCLE DIESEL WITH INTERCOOLED TURBOCHARGING

THE municipal power plant at Menasha, Wisconsin, one of the oldest of its type in the country, is stepping out with one of the newest innovations in the Diesel industry. Menasha has installed the first intercooled turbocharged Diesel to be utilized for stationary service commercially in the United States.

Like many city-owned power plants, this electric utility originally started as a water pumping station in 1905 with two, three-cylinder, 75 horsepower Diesel engines belted to triplex pumps. In 1907, a generator was belted from one of the engines to provide street lighting, and later, a few homes were supplied with electric service during the street lighting period. As the residential and commercial lighting load grew, there also arose a demand for 24 hour service. To meet the need for more capacity and improved service, a 225 horsepower engine was installed in 1911. By 1913 another 225 horsepower Diesel was in operation to meet power demands.

In this latter year litigation was started by the local public utility in an endeavor to prevent this expansion of services and resulted in the plant being shut down for two years. After the court had ruled in favor of the city, the plant resumed operation, handling all residential and commercial services. In the years which followed, two 600 and two 1200 horsepower Diesels were added to meet increasing demands.

Not long ago it was decided that one of the old 1200 horsepower, air injection Diesels should be replaced by a new 1200 horsepower Nordberg. The new Diesel is in operation today.

The installation of the Nordberg unit is of special interest in several ways. One of these is the use of intercooling of the supercharging air supplied. The engine is of the four-cycle type, 16 inch bore and 22 inch stroke and supercharged by an Elliott-Buchi exhaust gas turbocharger. The intercooling is done between the turbocharger and power cylinders. This is accomplished by a finned tube cooler located back of the covers on the exhaust side of the cylinder block. Raw water from Lake Winnebago passes through the tubes while the air from the turbocharger to the cylinders passes over the finned surfaces of the tubes. Tests made so far show that intercooling increases the rating of the engine between 18 and 20 per cent with the same mean temperature in the cylinders and the same average exhaust temperatures being maintained. Air passing through the intercooler is cooled to within approximately 15°F. of the water temperature, which at Menasha reaches a maxi-

Municipal power plant at Menasha, Wisconsin. The building to the right houses the Diesel generating equipment.

mum of 80°F. in the summer. Water after passing through the intercooler goes to the lubricating oil cooler, next to the heat exchanger of the engine cooling system and then discharges as waste.

Another interesting feature of the Menasha installation was the utilization of the old foundation and generator. This materially reduced the cost of installation and permitted the new unit to be placed in service much earlier than if the old foundation had to be removed, a new one built and a generator purchased at a time when electrical equipment was difficult to obtain. The old 850 kw. generator was built to operate at 300 rpm., while the normal speed of the Nordberg FS-166 engine is 327 rpm. This reduction in speed lowered the engine rating from 1200 to 1100 horsepower. Although the foundation for the old 1200 horsepower engine was considerably larger than that required for the new unit, fortunately it was of such shape and so located that it could be used with minor alterations. The two engines have approximately the same distance from shaft center to floor line. Cutting off six feet at one end of the foundation provided more room in the basement for engine auxiliaries. The original foundation bolts did not fit the new bedplate, so holes were drilled in the concrete and new bolts grouted in with Embeco.

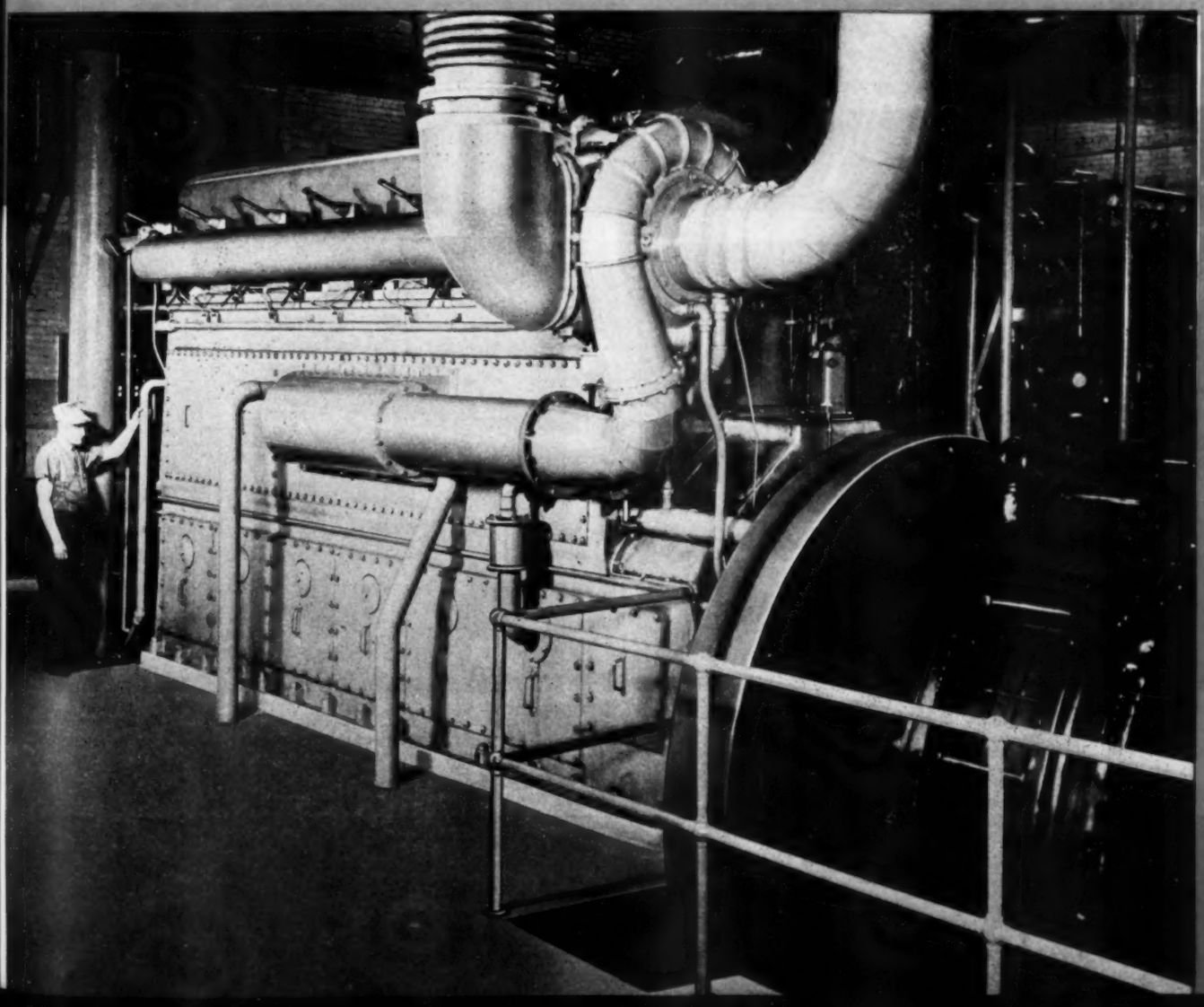
Using the old generator presented no unusual problem, in fact the generator was left in its original position. The principal problem was lining up the holes in the generator and engine shaft flanges and reaming the holes for fitted bolts.

The experience of the Menasha utility is similar to other municipal power plants in that there has been a constant growth in plant output. In 1936, 7,270,710 kw. hours were generated as compared with 9,945,293 in 1945. Since 1938 it has been necessary to purchase some power owing to the insufficient generating capacity of the plant to carry the peak loads. The combined generated and purchased power for 1945 reached a total of 14,402,793 kw. hours or about twice the city's requirements of ten years ago.

The Menasha utilities, both electric and water, are in charge of Supt. P. E. Widsteen. The Chief Engineer of the generating plant is William Riemer who has been associated with the utility since 1909 and Chief Engineer since 1925.

Mr. Riemer has seen the Menasha power plant develop almost from its inception as a pumping station into a modern, efficient Diesel plant.

Exhaust side of the new, 6 cylinder, 4 cycle Nordberg Diesel showing turbocharger and connection to intercooler.



DIESELIZATION OF MOUNTAIN EX

By HARRY WALKER

FROM sea level to the 7,500-foot crest of Donner's Summit within a mere 100 miles—

Through twisting canyons, up grueling grades and across the backbone of the Continental Divide with a 40,000-pound load—

Across torrid deserts—through bustling metropolitan streets—

All of these operating conditions are daily routine for Diesels of Pacific Intermountain Express, which in five years has grown to be the nation's second largest truck line operating as a common carrier west of the Mississippi. With its entire Western Division from the Pacific Coast to Denver completely Dieselized for "through" service and a fleet of new heavy-duty tractors and 60 new aluminum-magnesium trailers on order for its Eastern Division between Denver and the Mississippi Valley, "P.I.E." is blazing a spectacular trail of "Diesel Progress" (apologies to the editor).

Much of that progress already is reflected in the phenomenal skyrocketing of gross revenue —from a monthly total of $90,000 in 1940, to the current monthly average of more than $500,000.

P.I.E. has standardized on Cummins Diesel engines in Peterbilt tractors and is currently replacing the original 150 hp. engines with the new 200 hp. model Cummins. Sixty of the new engines are already in service and the balance of the fleet will be changed as rapidly as delivery can be made, say officials.

About two years ago, P.I.E. took over operation of the old M. K. & C. Trunk Lines whose routes extended from Denver to St. Louis and Chicago, via Kansas City. Thus, for the first time, P.I.E. became a "one-line" service, providing direct "through" facilities with unprecedented speed between the West Coast and Chicago.

"Due to the success of the Western Diesel operation, it was determined that a unit similar in every respect, except that it would be a single-drive, would be feasible between Denver and the Mississippi Valley," explained L. E. Robinson, superintendent of the Eastern Division.

"This division is now being re-equipped with single-drive Diesel tractors and tandem axle 32-ft. semi-trailers—a distinct departure from the usual type of equipment in the middle west," said Robinson. "Twenty-one such power units already have been assigned to the division—while the Western Division is equipped with dual-drive Peterbilts and tandem 35-ft. semi-trailers."

The P.I.E. fleet of heavy-duty Diesel tractors now in service totals 101.

From Denver to Salt Lake City across the Divide, running time is 18 hours. The first half of this run, Denver to Rawlins, on the Continental Divide is 248 miles. And, according to L. S. Vandine, P.I.E.'s ace driver, the Diesels make that pull in 3 hours less time than 4 gasoline engined tractors. Vandine

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P.I.E. Diesels pulling over the Continental Divide.

Diesel freighters in Echo Cranyon, east of Salt Lake City. This is typical terrain of the Western Division.

Some o

IN EXPRESS PAYS DIVIDENDS

knows because he drove gasoline engined equipment for four years over the same route. From Salt Lake City to California, the time is about 30 hours—and a 30-hour schedule is maintained also between Denver and Chicago and Denver and St. Louis.

In addition to its position as a leader in establishing transcontinental "through" service, P.I.E. also has been a leader in the use of refrigerated equipment. Construction of the new fleet of refrigerated aluminum-magnesium trailers was commenced immediately following the end of the war and already several are in service, with delivery promised at the rate of ten a month for six months. Producing them is Brown Industries, of Spokane, Wash. In addition to the new Brown trailers, P.I.E. also operates about 225 Fruehauf trailers.

During the war, P.I.E. reached a peak volume of 16,000 intercity tons per month and traveled over 1 million intercity truck miles. Strangely enough, the intercity mileage during April of the year was about 30 per cent higher than the highest wartime peak—and in the 24 hours ending May 14, P.I.E. handled 51 trailer loads totalling about 1½ million pounds in and out of its Denver terminal. This was an all-time high for the entire system.

Superintendent Robinson reports a substantial decrease in operating costs by virtue of the Dieselization, improved equipment and advanced research done by P.I.E. technicians—and anticipates further cost reduction per pound of freight with the new equipment.

An extremely vital element of P.I.E.'s favorable cost ratio is its perpetual research and testing operations—plus strict maintenance and overhaul specifications.

P.I.E. uses extraordinary measures to get the most efficiency out of its engines. An unusual feature of the main shops at Salt Lake City is the fact that engines are not overhauled as a unit, but on a time-saving production-line basis. An engine requiring overhaul is disassembled and all parts thoroughly cleaned. At that point the engine loses its identity because the various parts are placed in different cabinets in the shop.

The parts are then repaired and rechecked on a "mass production" basis and stored in the stockroom. The "assembly" crew then draws from the stockroom all parts necessary for the re-assembly of an engine.

Even more precise in its scope is the testing by the latest type of testing equipment of various parts. Much of it was "tailor-made" by P.I.E. specialists for certain work. A few of the P.I.E.-designed testing machines are described as follows:

A connecting rod boring jig that controls the distance between the centers of the large and small holes so that it will never vary as much as .001 inch after the new bushing has been bored.

A cylinder sleeve boring jig with case hardened sleeve seats and top surface ground with micro-

Some of P.I.E.'s newest Diesel tractor-trailer additions at the company's Salt Lake City terminal.

The newest type tractor-semi-trailer unit. It is a Peterbuilt Dual drive tractor powered with a 200 hp. Cummins Diesel. The aluminum semi-trailer is by Brown industries and is completely refrigerated.

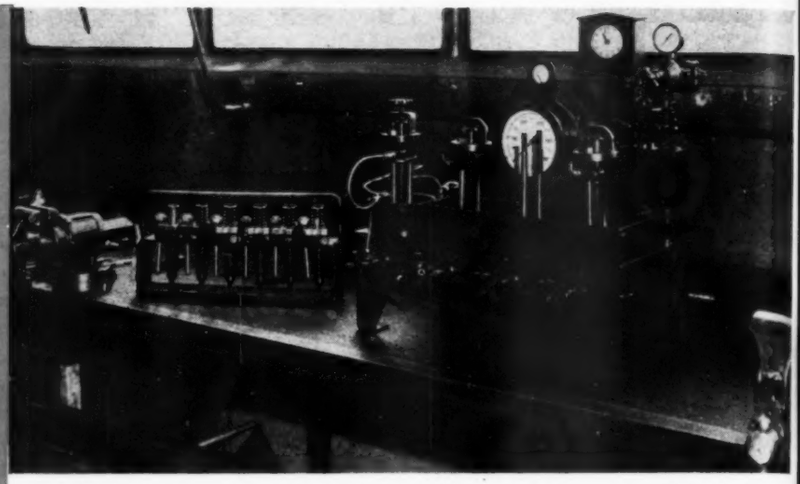
scopic accuracy, thus assuring a perfect boring job.

A fuel pump test stand which can measure the output to all six injectors individually or collectively at any desired speed.

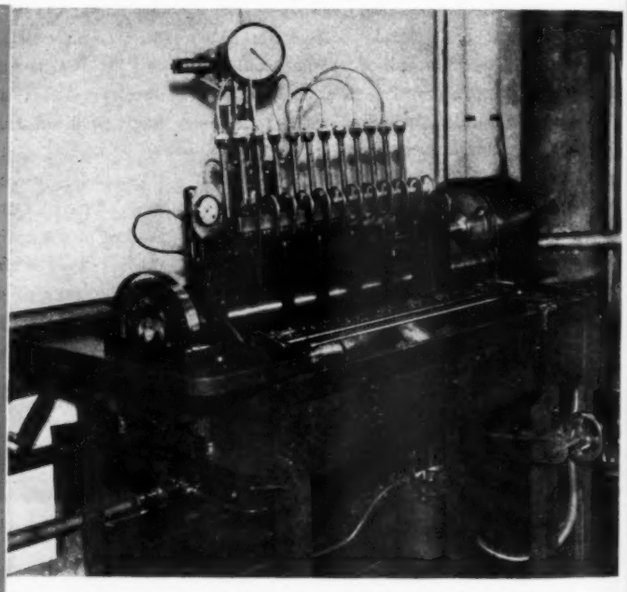
An injector test bench which inspects all injectors under 2,500 lbs. hydraulic pressure and measures the leak around discharge plunger, checks for leak in check valve, detects cracks in body of injector, checks pattern of fuel spray from tip and tests the injector fuel tube check valve opening pressure.

A Magnaflux of the wet type is used for detection of flaws in all important components of the engine. Parts are always junked at the first indication of a flaw or crack in any of the parts tested.

Stated briefly, the research and testing "know-how" of P.I.E. technicians is among the most unique in the entire truck transportation industry—and from P.I.E. laboratories, the manufacturers themselves gain much valuable knowledge to incorporate in modern Diesel engine design.

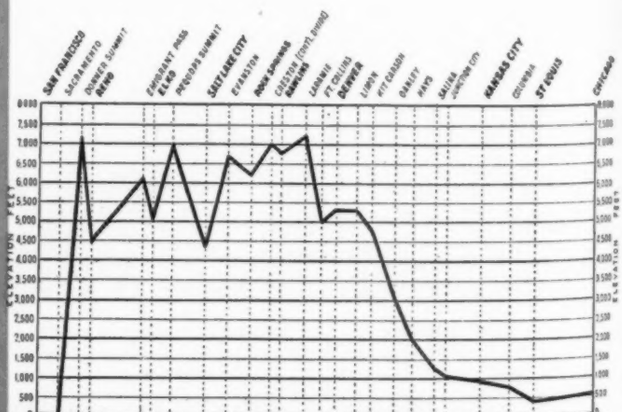


The Salt Lake City shops of P.I.E. are completely equipped. A special injector test stand is seen here.

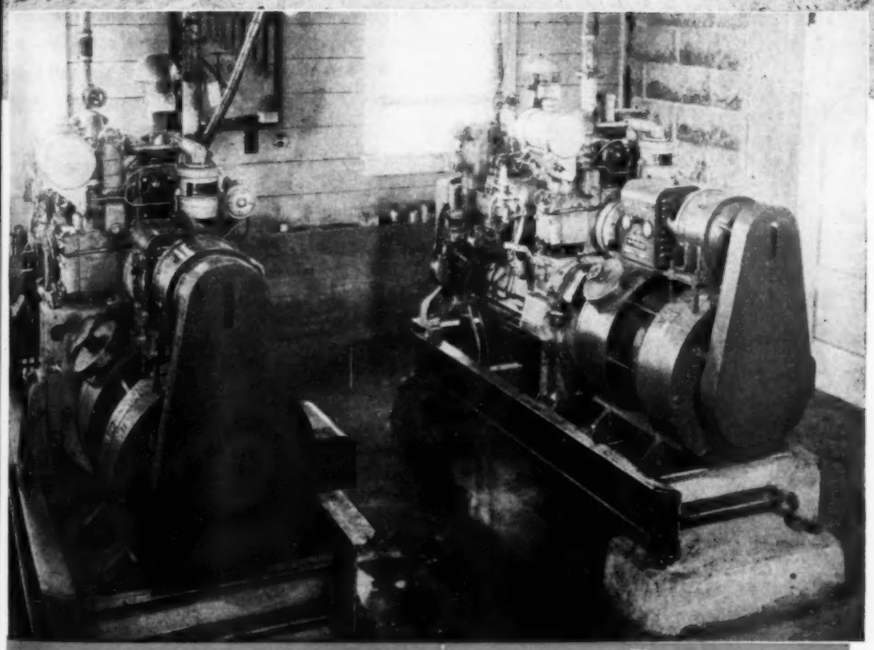


Fuel pump test stand designed for complete checking of Cummins fuel pumps. Excellent maintenance is the keystone of P.I.E.'s Diesel success.

Road map of a portion of the Western Division showing delivery points.



Right: Profile chart of P.I.E.'s complete route showing the punishing hauls the big Diesels make in record time.



(Above) Main Street of Sinai, South Dakota, showing garage "power plant."

(Left) Two Caterpillar Diesel generating sets which supply town's electricity.

PRIVATE GARAGE IS PUBLIC UTILITY

J. J. HAUGSTAD of Sinai, South Dakota, is the manager of the Sinai Garage—an establishment that caters to all sorts of automotive repair work in the community of 215 people and the surrounding area.

The Sinai garage needed electricity generated by a modern Diesel installation. By using kerosene burners, this concern had been depended upon for some years as the town's local utility. But to service the entire community completely it required installation of modern Diesel equipment.

So the Sinai garage took matters into its own hands by installing two "Caterpillar" Diesel electric sets, and commenced producing its own electric power and enough for its fellow townsmen. There were a dozen commercial concerns using power and almost 50 domestic customers.

The garage was kept well heated—Haugstad had arranged a cooling system so that hot water would pass through radiators to warm the 60 ft. by 60 ft. by 12 ft. area. Power produced by the Sinai Garage even powers the local telephone switchboard presided over by Mrs. Ellen Olson. Naturally the power serves for refrigerators, toasters and other appliances in the homes and the stores along the town's main street are supplied light by that source.

The process of power generation and distribution is simple. The two Diesel units put out current at 480 volts and it is stepped down to 110 volts at the transformers. The smaller Diesel runs almost 18 hours during the day and when the night-time load increase calls for it, a switch is made to the larger unit which handles the entire load. The smaller "Caterpillar" has clicked off better than 31,500 operating hours on its hour meter and the larger unit has 16,356 hours to its credit.

Manager Haugstad freely admits "There has never been a time summer or winter, when Sinai lacked electricity due to any failure of the power units. The only times the 'juice' was ever off were after some severe sleet storms and a couple of times when electrical storms burnt out some transformers."

The community is really electrified, from refrigerators to electric razors—and the Sinai Garage breezes right along, still doing business in its customarily efficient manner.

BETTER than one in every three homes in the village of Janesville, Minnesota, population about 1,300, cooks with an electric stove. There are 134 stoves on a total of 360 residential meters. The ratio of 37 per cent is only one of a number of straws indicating that Janesville folk like the service of their municipal Diesel electric plant. They pay their bills promptly, with no delinquency. They recently increased the plant capacity by three-fourths.

The plant's initial two Diesel engines have a combined horsepower of 600 and their alternators a rated capacity of 398 kilowatts. Addition of a new six-cylinder engine in the late summer of 1945 raised the total horsepower to 1,050 and the capacity to 698 kilowatts, nearly twice last year's peak load of 350 kw. All three Diesels are of Fairbanks, Morse & Co. make, regulated by Woodward governors and equipped with Maxim and Fairbanks-Morse silencers.

Measured against the 1945 peak, the three units have a reserve of nearly 100 per cent. Any two units can serve such a load, but the two smaller units were hard driven to do their job before the new unit was added.

Value of plant site, building, heavy machinery, other equipment and distribution system comes to about $155,000, without depreciation. A public-spirited citizen gave most of the site to the village. A federal grant of $31,455—remember "PWA"?—and issues of revenue certificates financed the enterprise. Plant earnings had retired $63,792 in certificates by December 31, 1945, as well as having paid interest from year to year. The outstanding certificates, totaling $57,200, are to be paid off by January 1, 1951.

Of the 194 meters, other than residential, in the distribution system last year, 82 were commercial light, 78 hot water, 29 power and 5 commercial heat. Major industries using power included a feed mill, three hatcheries, a creamery, two grain elevators, two locker plants and a poultry processing plant.

Performance of the plant in the nearly seven-year period—fiscal years to April, 1942, calendar years after 1942—is presented in the accompanying table.

Long before the utility's franchise expired in 1939, Janesville had given thought to putting in a municipal plant. The utility's residential rate schedule, devised on a room-count basis, was a major irritant.

The room-count schedule, residential, had led off with a fixed charge of 10 cents a room per month, to be added to energy charges which ran as follows:

	per room	
First	6 kwh. per month	at 6 cents a kwh.;
Next	50 kwh. per month	at 3.5 cents;
Next	50 kwh. per month	at 2.5 cents;
Next	200 kwh. per month	at 2.0 cents;
Excess	kwh. per month	at 1.5 cents.

There was a 5 per cent discount for prompt payment. The minimum charge was the fixed charge but not less than $1.00 net per meter per month. If you had made at least a "B" grade in "figgers," you could compute your monthly bill.

Take three users whose consumption for a month was 60 kwh. each. The first, in a four-room house, paid $2.95. The second, in a six-room house, paid $3.42. The third, in an eight-room house, paid $3.90.

Obviously, electric rates in Janesville penalized, if not deterred, the building of large dwelling houses. They might seem to have disfavored the building of large families, too. The problem was thus both economic and social.

One might think that when the utility proposed to abolish the room-count method, the persons living in houses of more than four rooms would be overjoyed. Weren't they to have their bills cut? But one never can tell. The proposal may have made them mad, too, when they thought of how long they had been paying those higher charges. What they did do was to reason somewhat like this: "If the company can do it, we can do it ourselves."

So the village went ahead and voted in a municipal light and power plant. The plant adopted virtually the same residential schedule of rates as the utility's energy rates except for the top and beginning rate. The plant ignored the number of rooms in a consumer's house and set this top rate: "First 40 kwh. per Month at 6 cents each." This municipal schedule has never been changed. It is in effect today.

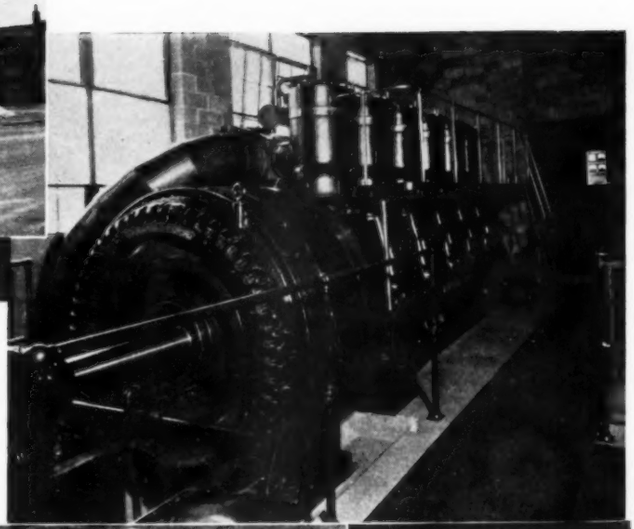
Residential charges net for monthly consumptions from 10 to 100 kilowatts hours on the utility's room-count basis for four, six and eight rooms are compared in the following table with the net charges of the municipal plant:

Kwh. per month	UTILITY 4 rooms	6 rooms	8 rooms	MUNICIPAL
10	$1.00	$1.14	$1.33	$1.00
20	1.52	1.71	1.90	1.14
30	1.95	2.28	2.47	1.71
40	2.28	2.76	3.04	2.28
50	2.61	3.09	3.56	2.61
60	2.95	3.42	3.90	2.95
70	3.28	3.75	4.23	3.28
80	3.55	4.08	4.56	3.61
90	3.79	4.38	4.89	3.94
100	4.03	4.62	5.21	4.18

For commercial lighting, the municipal schedule has a top rate of 7 cents for the first 50 kilowatt hours and a bottom rate of 1½ cents for excess over 2,500 kwh., with five intermediate rates. The power schedule, municipal, ranges from 5½ cents for the first 200 kwh. to 2¼ cents for excess over 4,500 kwh., with three intermediate rates. It has a minimum of $1.00 per horsepower for the first 2 hp., and 50 cents per horsepower for each horsepower over 2 hp. "We are proud of the fact that we have no delinquent accounts," says Harvey E. Gardner, Chairman of the Water, Light, Power and Building Commission, which directs the plant. "Our practice of offering a discount for payment of residential bills on or before the due date, as against assessing a penalty after failure so to pay, has encouraged prompt paying as well as led to higher consumption."

Year	Volume generated	Av. Kwh. revenue	Del. cash per Kwh. generated	Kwh. per gal. of fuel oil	Peak load
3/23/39-3/31/40	746,150 kwh.	2.85c	1.38c	11.6	230 kw.
4/ 1/40-3/31/41	846,410	3.06	1.30	11.7	265
4/ 1/41-3/31/42	900,830	3.06	1.40	11.9	285
4/ 1/42-12/31/42	727,319	2.83	1.44	12.7	255
1943 (calendar)	974,730	2.99	1.34	12.2	290
1944	1,014,630	3.01	1.40	12.4	290
1945	1,093,180	2.89	1.52	12.7	350

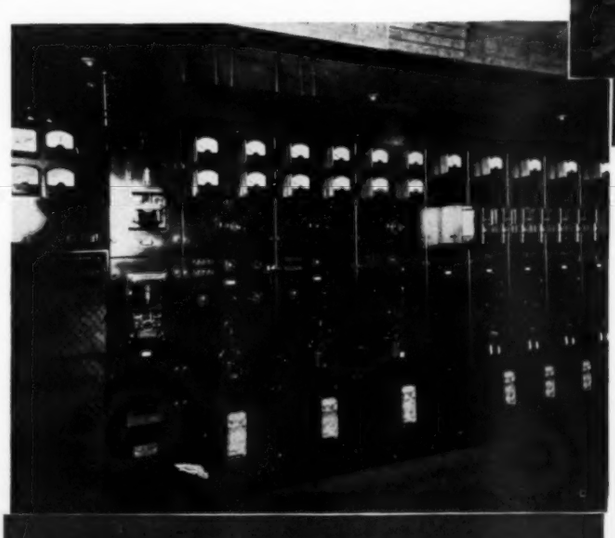
This modern building houses the Janesville, Minnesota, municipal power plant and fire department.



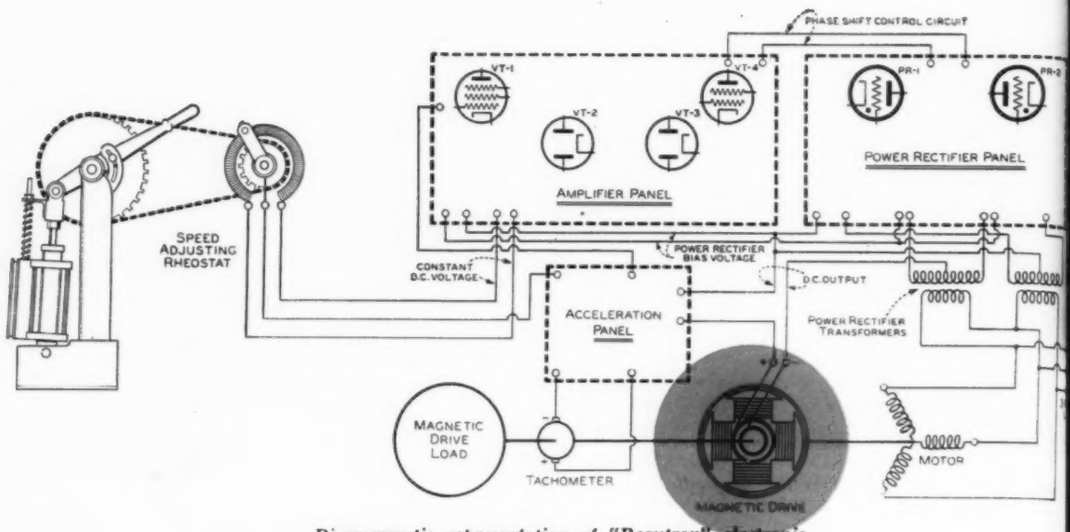
One of the two original F-M Diesel generating units, each rated 300 hp.

Two of the three F-M Diesel generating units at Janesville. At the left is seen the new 400 hp. unit installed in 1945.

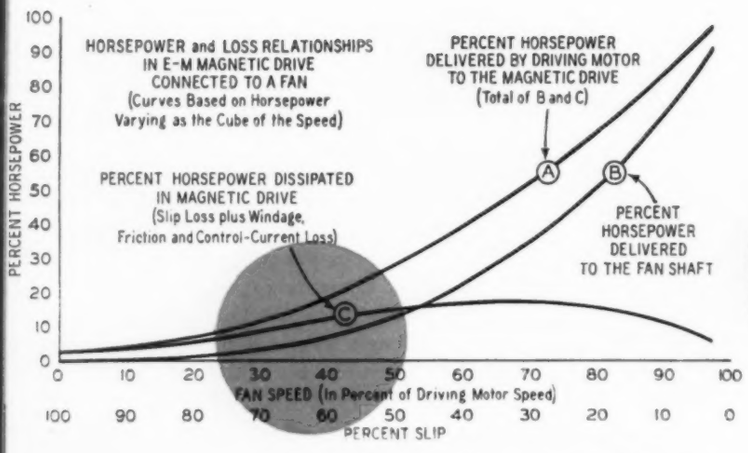
View of the plant's modern, dead front switchboard.

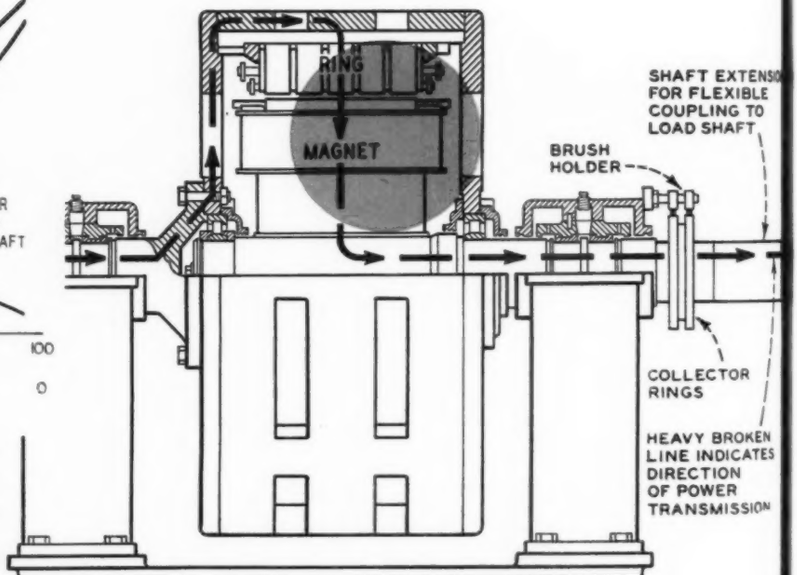


View of the pump room with water circulating system seen, left.

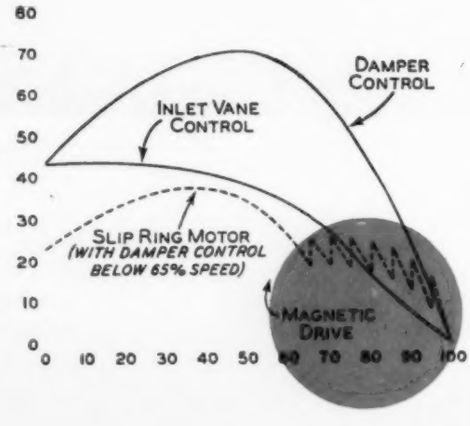


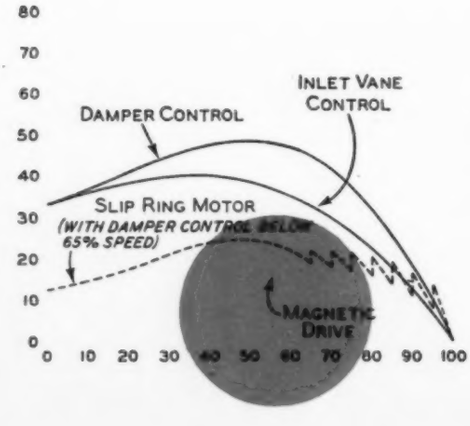
Diagrammatic representation of "Regutron" electronic controller for Magnetic Drive. The controller maintains required excitation for the unit.


HORSEPOWER and LOSS RELATIONSHIPS IN E-M MAGNETIC DRIVE CONNECTED TO A FAN
(Curves Based on Horsepower Varying as the Cube of the Speed)
PERCENT HORSEPOWER DELIVERED BY DRIVING MOTOR TO THE MAGNETIC DRIVE
(Total of B and C)
PERCENT HORSEPOWER DISSIPATED IN MAGNETIC DRIVE
(Slip Loss plus Windage, Friction and Control-Current Loss)
PERCENT HORSEPOWER DELIVERED TO THE FAN SHAFT
A
B
C
PERCENT HORSEPOWER
FAN SPEED (In Percent of Driving Motor Speed)
PERCENT SLIP



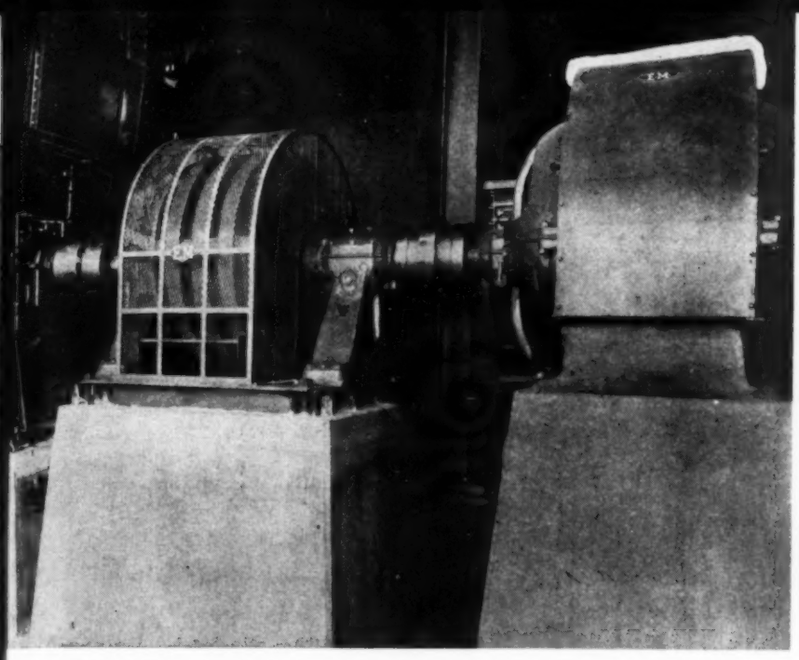
Above: Horsepower-loss curve of E-M Magnetic drive. Compare with curves below. Right: Diagrammatic cross-section of Magnetic drive unit showing the ring and magnet construction.





Curves at far left represent power losses which accompany various controls for forced draft fans. Companion curve show losses for induced draft fan control. Compare with Magnetic drive loss, Curve C, above.

MAGNETIC DRIVE FOR ADJUSTABLE SPEED TORQUE TRANSMISSION



This 752 hp., 1164/180 rpm. Magnetic drive is installed at a large southern power plant driving induced draft fan.

THE power industry has extensive application for automatically controllable torque transmission through a wide range of speed. The magnetic drive is the logical choice for those applications with a horsepower-torque relationship like that found with boiler draft fans.

The adjustable speed magnetic drive system consists essentially of a constant speed motor driving a Ring. The Ring of the magnetic drive revolves at the same speed as the driving motor. The Magnet, separated by an air-gap from the Ring, is free to revolve within the Ring. Poles of the Magnet are excited by direct current through collector rings on the Magnet shaft. A difference in speed between the Ring and the Magnet results in a cutting, by the Ring, of the magnetic flux produced by the Magnet. This induces current in the Ring, forming a magnetic field in the air-gap. The magnetic field pulls on the poles of the Magnet, thereby causing the Magnet to revolve. Torque transmission takes place through the air-gap between Ring and Magnet. The amount of torque is varied precisely and over a wide range by varying the excitation of the Magnet, thus controlling its speed. The speed of the Magnet is dependent at any time on two factors: (1) the amount of control current, which determines the torque transmitted between motor and load, and (2) on the torque required by the load. Since the amount of control current is instantly controllable electronically, the load speed can be kept constant regardless of change.

The difference in speed between Ring and Magnet can be considered in terms of slip. When the Magnet is stationary and the Ring is at full motor speed, the slip between Ring and Magnet is 100%. As the speed of the Magnet increases, the slip decreases proportionally to the speed. When full rated excitation is applied to the Magnet, and it is carrying full rated load, the slip is 3%, which is the standard rated, full load minimum slip; thus, the maximum load speed is 97% of the speed of the motor.

The magnetic drive is purely a torque transmitter; its torque output is always approximately equal to the torque input at any speed. It is not a torque converter (multiplier).

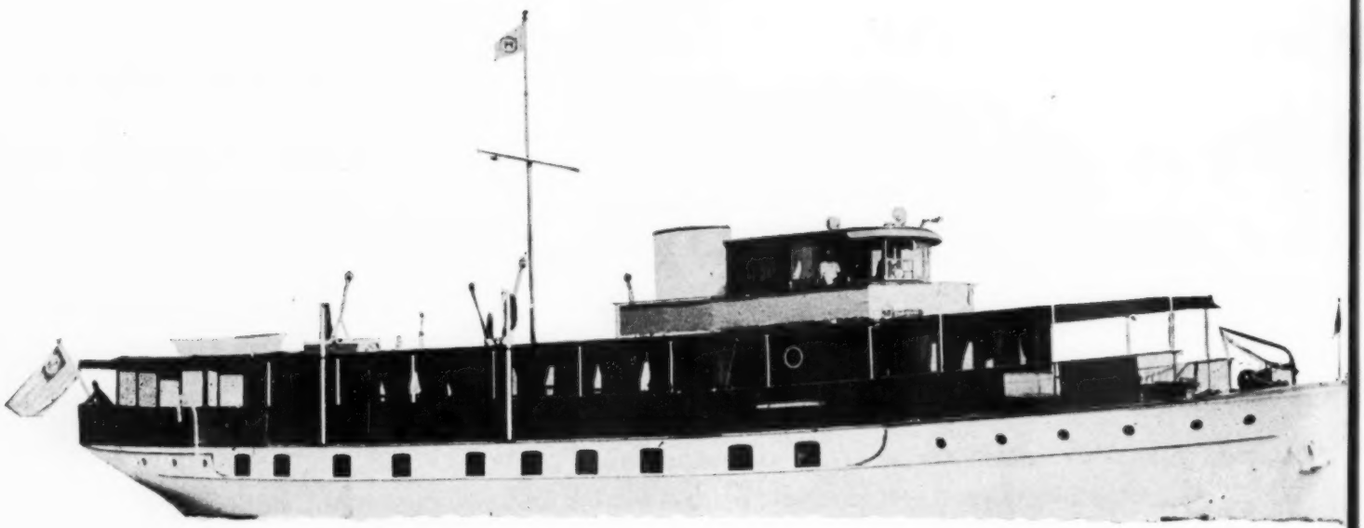
As regards speed response, a change in excitation to the magnet drive causes a practically instantaneous change in the torque transmitted. The rate of change of speed of the load, however, depends not only on the change of torque, but on the WK2 of the load as well. The available maximum torque for acceleration will generally be not less than full load torque at the usual range of load operation.

The losses consist of slip loss, which appears as heat loss in the ring; excitation loss in the magnet; windage and friction loss. The slip loss is the principal loss, the latter two being quite small. The slip loss varies directly with the difference in speed of rotation between Ring and Magnet, or between motor and load. Thus, at 3% minimum slip, 3% of the output of the motor will be dissipated as slip loss in the Ring.

In the most important application, that of boiler draft fans, the power requirement drops off rapidly at reduced speed. With the fan shaft operating at 50% of the motor speed, 50% of the output of the motor at that fan speed will be slip loss in the Ring. At such reduced speed, the energy dissipated in the magnetic drive is not unduly large because the power required by the fan decreases approximately at the cube of its speed. Motor power output is consequently reduced to a comparatively small value. The magnetic drive slip loss at its maximum is only 15% of the full load rating of the magnetic drive when operating a fan or load of similar characteristics.

Control of excitation to the magnet and thus of the speed is accomplished electronically. A three phase, 220 or 440 volt supply is rectified and controlled to maintain the adjustable speed requirements. Output of a small tachometer generator driven from the magnet shaft actuates the control to hold operating speed of the load accurately as selected. Speed is selected by positioning the arm of a small potentiometer which is actuated by some type of automatic control such as the usual form of automatic combustion control.

Inherent features of the drive are advantageous in any application characterized by load torque which drops off rapidly with speed reduction; fans, centrifugal pumps, centrifugal refrigeration compressors, and centrifugal blowers fall in this classification. Magnetic drives are used for cement kiln fans, iron ore sintering fans, wind tunnels, propeller test stands, and other applications where the flow of air must be regulated.



ABOUT sixteen years ago the 110 ft. by 20 ft. houseboat *Maemere* was built by John Trumpy at Camden, N. J., to the order of the late De Witt Page of Hartford, Conn., for cruising in southern waters. When first commissioned she was powered with two eight-cylinder airless-injection Winton Diesel engines of 300 hp. each, which gave her a speed of approximately 16 statute miles per hour.

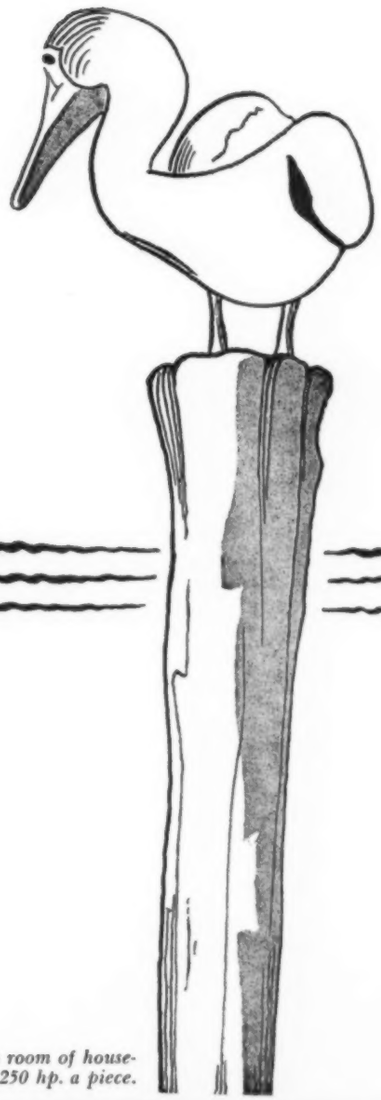
This fine houseboat, now renamed *Big Pebble* and owned by E. S. Moore of New York City, was recently overhauled and re-equipped with a pair of General Motors Model 4-268A Diesel engines of 250 hp. at 1,300 rpm., supplied by the Cleveland Diesel Engine Division of General Motors. The installation work was carried out at Dooley's Basin & Dry Dock, Inc., Fort Lauderdale, Florida. The new engines are of the two-cycle type with four cylinders 6½ in. bore by 7 in. stroke, and they drive twin screws through reverse and reduction gears. Auxiliary power is supplied by a Model 2-71 20-kw. General Motors auxiliary generator set.

Her new power plant is exceedingly compact, making the engine room exceptionally roomy for a vessel of the length of the *Big Pebble*. In fact, the overall dimensions of each engine from the forward end to the coupling aft, are but 9 ft. 7⅞ in. long by only 2 ft. 10 in. wide, while the weight is about 7,000 lbs. Such a feature makes this model ideal for medium sized

View of "Big Pebble's" master bedroom.

View of living room looking forward.

FLORIDA HOUSEBOAT REPOWERED

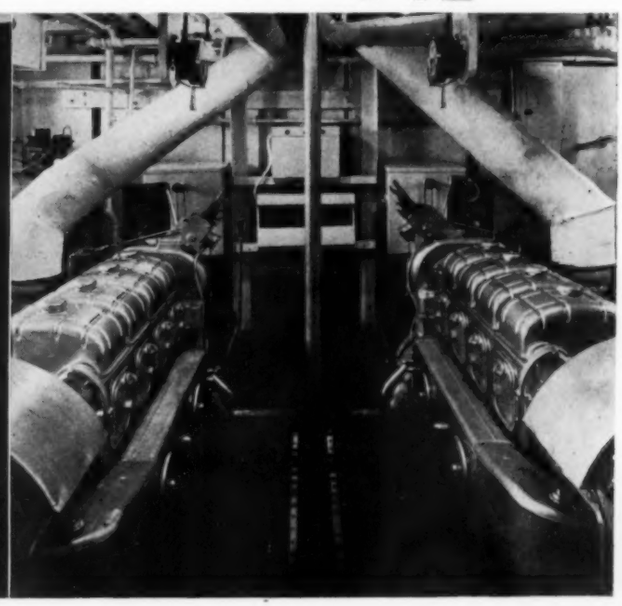


vessels, where living space is important.

The hull of the *Big Pebble* has a slightly raked bow and an overhanging stern. The pilot house and captain's cabin are on the upper deck, which allows the forward end of the main superstructure to be used as a large smoking room that has an unobstructed view forward. Next in line is the dining saloon and then comes a very large lounge tastefully furnished and decorated. The owner's and guests' sleeping accommodations are below, while the engineers' and crew's quarters are in the forecastle forward of the engine room.

The shallow draft of this fine houseboat, namely 4 ft. 6 in., allows her to cruise in many inland waters, but she also is seaworthy enough for outside requirements. Her latest model General Motors Diesels have given the *Big Pebble* a new lease on life for the relaxation and enjoyment of her owner for many years.

(Below) Another view of the "Big Pebble's" attractive living room looking aft. (Below, right) Engine room of houseboat showing main propulsion Diesels. They are four-cylinder General Motors engines which produce 250 hp. a piece.



HOSPITAL DIESEL WILL SAVE $16,500 I

By BRUCE C. SISSON

THE Lenox Hill Hospital of New York City is not resting on its service record, a record which dates back to the day in 1857 when it first opened its doors. This $8,000,000 hospital now occupying an entire city block, is read to increase its already manifold activities in the field of public health and service, after five arduous years of wartime service.

Financing such a large undertaking is very important, and budgets must be watched closely. So it was that the officials of the Hospital in seeking to cut operating expenses decided that the cost of power production for the hospital could be cut appreciably, especially during the summer months by the installation of a Diesel generating set. After due consideration it was decided that the installation should be made and in June 1945 work was started on the installation which was to comprise a 750 hp. Worthington Diesel and a 500 kw. Crocker Wheeler DC Generator.

The problem of mounting the engine was of great importance as Mr. Lehrmann, the Chief Engineer, told us because it was necessary to eliminate all vibration that might be carried to the rest of the hospital building. To this end the basement excavation was made down to bed rock some 20 feet below the sub-basement floor and concrete was poured into forms which made a fifty foot block of concrete with a rectangular depression in the center for the actual engine base. This floating engine base of reinforced concrete with seven heavy steel I beam extensions on each side, rested on 14 Korfund spring mountings installed along the girder-reinforced sides of the main foundation. The total weight of the engine, generator and floating base is 170 tons.

The installation was completed in May of this year and is now ready to deliver economical power for the hospital.

Up to the time of the Diesel installation the hospital was supplied power by a steam installation entirely. A Skinner Uniflow driving a 400 kw. Crocker Wheeler generator handled the load during 20 hours a day and two smaller steam engines driving 75 and 125 kw. generators supplied the balance of the day's power. Under this system there was no time for maintenance on the Uniflow engine, since it was forced to operate 20 hours a day, 7 days a week. Furthermore, in the warmer months of the year, when steam demands were less, there was a considerable waste of steam which could not possibly be avoided.

The new Diesel will generate more power than the Uniflow and at the same time cut overall operating cost some $16,500 for its 5 months' summer operation alone.

In addition to its vibrationless base there are several other vibration and noise controls incorporated in the installation. There is a complete silencer installation with an American air filter, a Maxim intake silencer and a Maxim waste heat recovery exhaust silencer. All these are supported or hung from Genspring Non-Resonant Variable Support Hangers to eliminate any vibration which reaches this equipment through the flexible connections to the engine itself. The engine room is insulated by ¾ in. of asbestos covering the ceiling.

The engine itself is a 750 hp., 327 rpm. Worthington with a 16 inch bore and 20 inch stroke. It is a four stroke cycle engine. The generator is a 500 kw., D.C., 250 volt compound wound, 3 wire Crocker Wheeler. The crankshaft of the engine and the armature shaft of the generator were manufactured by Erie Forge. The cooling system installed is of interest. Utilizing a closed system, the cooling of the lubricating oil and jacket water is accomplished by using the discharge from the hospital's refrigerant condensers. This water at approximately 70°F., flows to a float controlled receiver tank in the engine room. From there it is pumped through the Ross oil cooler and heat exchanger thus cooling lubricating oil and jacket water. The engine cooling system consists of a separate expansion and make-up tank and a Worthington circulating pump.

The fuel system includes a 6,000 gal. concrete enclosed storage tank and an engine-mounted fuel oil transfer pump, which delivers fuel through Cuno filters to American Bosch fuel injection pumps. A Pneumercator gauge is installed for the fuel tank and a fuel meter by the Xacto Meter Company meters Diesel fuel in 1/10-gallon units.

The lube system is of the wet sump type and is amplified by Manzel cylinder lubricators. The sump capacity is 140 gallons. Paragon 30 SAE oil is used. A 4-unit Cuno lube oil filter is installed.

The starting air is supplied by a Worthington

Architect's drawing of the $8,000,000 Lenox Hill Hospital, where the new Diesel is installed.

Picture taken from atop the Diesel showing the Maxim air intake silencer at left and the Wright hoist at the far right.

IVE MONTHS

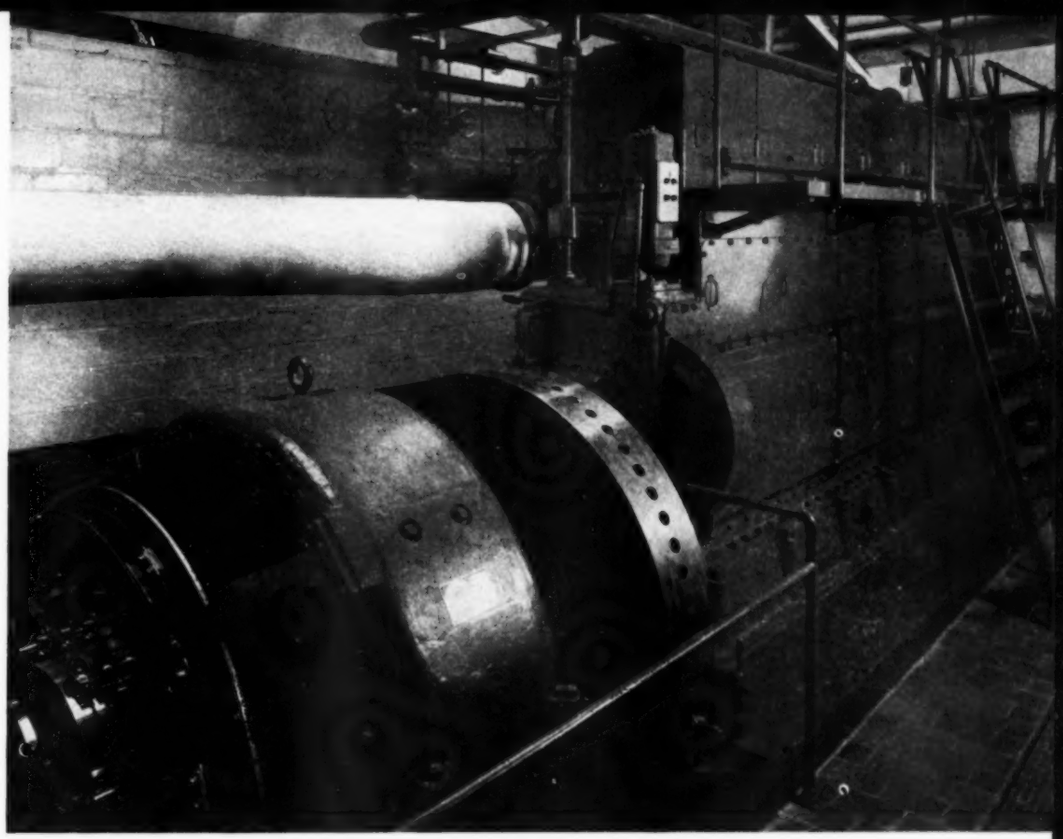
2-stage compressor. Air is stored in two banks. Engine starting air at 150 psi. is sufficient although the system is capable of supplying air at 250 psi. An air jack is installed which rotates the 5½ ton, 72 in. flywheel when it is required.

Hans Lehrmann, Chief Engineer of the Hospital, is planning several additions to the engine equipment. In the near future he plans to install a Weston Tachometer utilizing a Morse chain drive. He is proud of his new Diesel and his engine room proves it. The arched engine room is excellently lighted with fluorescent lamps. A color scheme of blue and light red actually makes for better lighting and less glare.

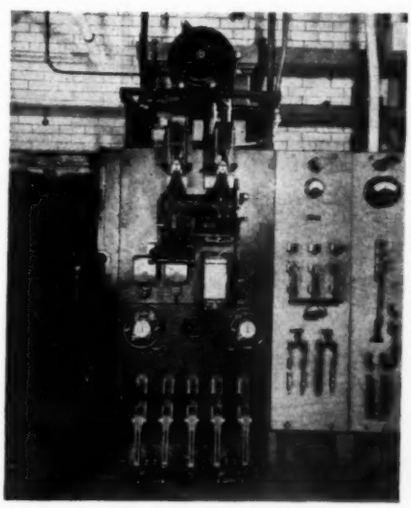
Owing to the newness of the installation Mr. Lehrmann has not had time for extensive fuel consumption and other tests but on the basis of what trials he has made with the new Diesel, he estimates a saving of $16,500 for 5 months' operation this summer over former power production costs. By utilizing the steam from the waste heat recovery silencer he will be able to supply part of the hospital demand and will therefore save a substantial portion of the expense of boiler operation.

The electrical switchboard installation is by Metropolitan Electric Co. of Long Island City and includes a 250 volt I.T.E. circuit breaker, a Sangamo Electric Company watt-hour meter and a Cutler Hammer rheostat.

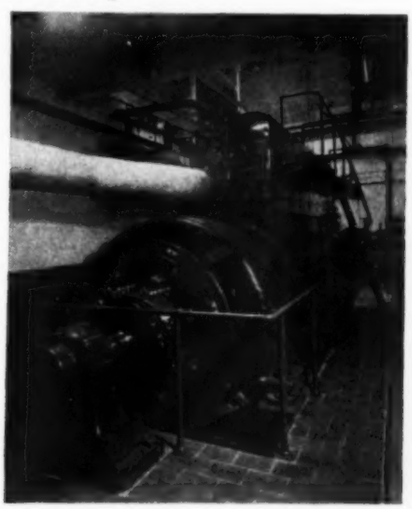
Diesel has been selected again for the dependable service required for hospital duty.



View of Lenox Hill Hospital's new 750 hp., 327 rpm. Worthington Diesel and 500 kw. Crocker-Wheeler generator.

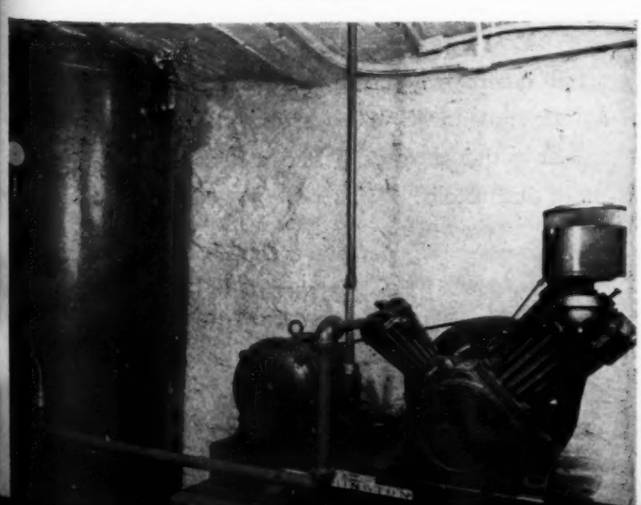


Electrical switchboard for the new generator set was supplied by the Metropolitan Electric Company. It includes a Cutler Hammer rheostat.

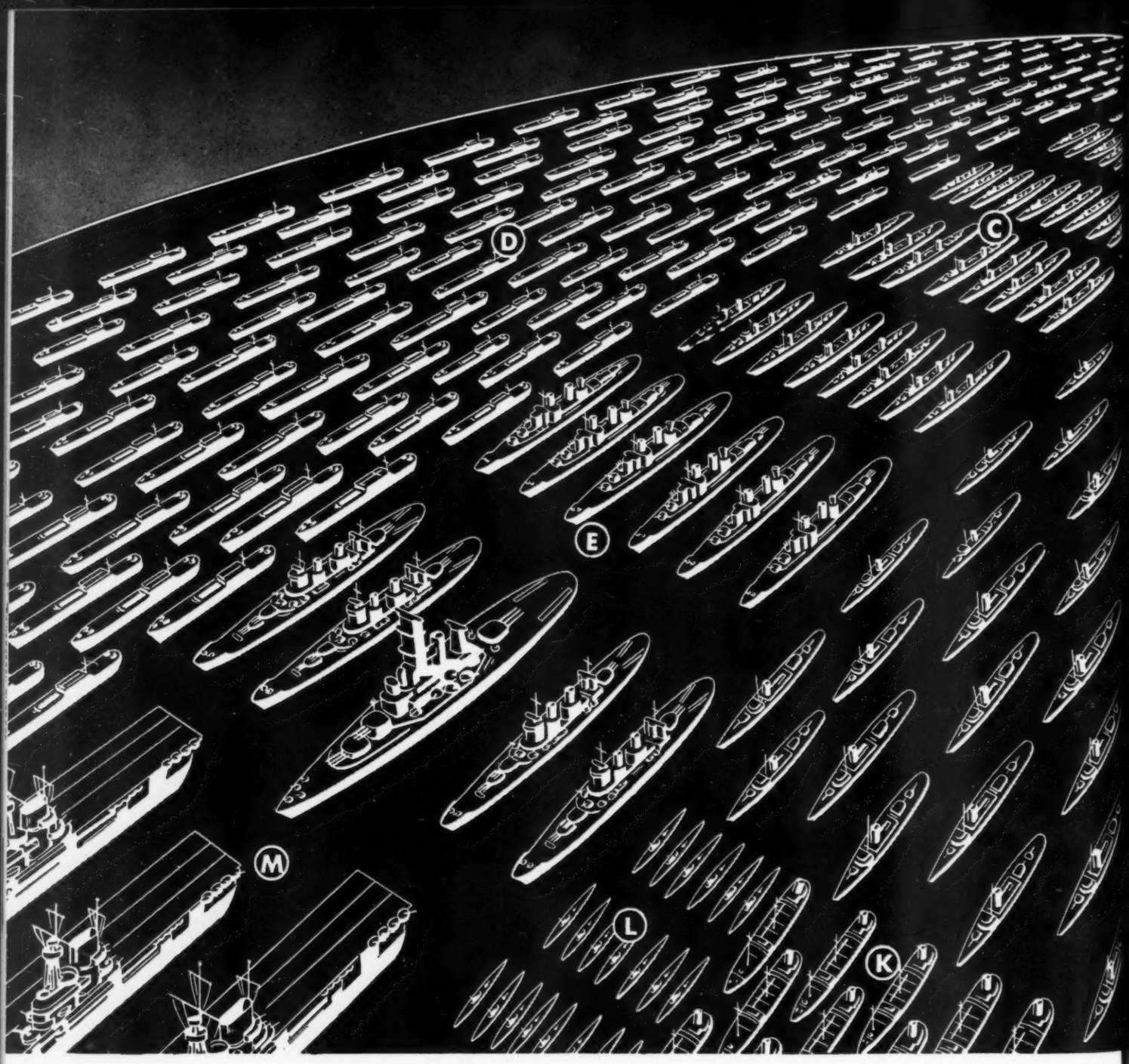


Another view of engine generator set. Here the division of the floating base and the sub-basement floor is clearly seen at right.

Worthington Air Compressor which supplies starting air at 250 psi. to the Diesel.



Close-up of the Maxim Waste Heat Recovery Exhaust Silencer which generates steam for the Hospital. It is mounted on Gen-spring Variable Support Hangers for vibration control.



5,589 vessels went to war with Cleveland

SOME OF these warcraft, like the 12,000 h.p. submarine tenders, the submarines and landing ships, got all their power from these General Motors Diesels. Others like the battleships, cruisers and destroyers, used them for auxiliary power. Altogether the 5,589 vessels took 21,709 engines.

How did they do? The stories are still being told and retold.

Legend:

A — 89 Tenders
B — 299 Cargo Vessels and Barges
C — 399 Destroyers
D — 1817 Landing Ships
E — 79 Battleships, Cruisers, Gunboats
F — 1140 Submarine Chasers, and Escort Vessels
G — 992 Minesweepers, and Mine Layers
H — 48 Transports
I — 97 Patrol Vessels, Rescue Boats, and Salvage Vessels
J — 376 Tugs
K — 27 Tankers
L — 141 Submarines
M — 85 Carriers, Ammunition Ships, Dredges, and Other Vessels

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om them all you can reach this conclusion:
gines can be put to highly profitable use
etime operators of ships—from big ocean
hard-working little harbor tugs.

GM
GENERAL MOTORS
DIESEL POWER

ENGINES 150 TO 2000 H.P.

CLEVELAND DIESEL ENGINE DIVISION
CLEVELAND 11, OHIO
GENERAL MOTORS

CYCLOIDAL PROPELLER REVOLUTIONIZES SHIPHANDLING

TESTS conducted recently on the Navy LSM 458 equipped with the revolutionary new cycloidal propeller opened a new age in marine navigation according to unofficial naval reports. Two Navy admirals described the feats of the 900-ton craft as "unbelievable" and "fantastic" during the test maneuvers held in Puget Sound near Bremerton, Washington.

Invented by Professor Frederick K. Kirsten of the University of Washington, the cycloidal propeller was designed and built by Pacific Car and Foundry Company at Renton, Washington, with Kirsten as consulting engineer. The new propeller, which utilizes blades instead of the conventional screw, was installed on the 900 ton LSM 458 at Everett Pacific Shipbuilding and Dry Dock Company of Everett, Washington, under the supervision of T. M. Rowlands, Chief Engineer.

One of the astounding maneuvers made by the LSM during the test runs was athwart-ship propulsion without ahead or astern movement of the ship. That is, the ship actually moved sideways under its own power. The vessel also was spun completely around without fore or aft movement, using its bow as a pivot.

The cycloidal propeller consists of twin propellers having an orbit diameter of seven feet, equipped with six vertical blades, each of which revolves on its own axis, as the rotors revolve. These twin rotors, circular steel housings flush with the hull, are connected to the vessel's drive shaft with a right-angle, beveled gear drive. Although the propeller somewhat resembles an egg beater, the principle is wholly different in that the revolving blades push all the water in one direction, whereas an egg beater throws fluid in two directions.

Paul Pigott, President of Pacific Car and Foundry Company, stated that the propeller will prove of great value for such vessels as tug boats, crane barges, ferry boats, and inland and river watercraft of all types. Thor Henrikson, Chief Engineer, indicated that the use of the cycloidal propeller will result in a smoother and more streamlined hull. This is made possible by elimination of rudder gear and other appendages in screw ships. The tests indicated that the propeller materially reduces vibrations inherent in screw propulsion.

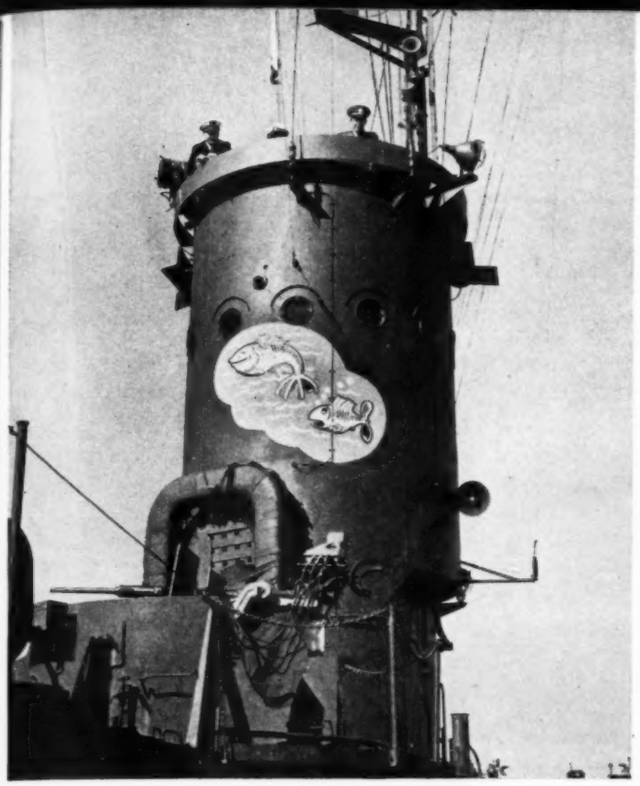
Professor Kirsten, the inventor, first conceived cycloidal propulsion in 1921 and at that time, undertook considerable research and development. Many tests were performed at the University of Washington wind tunnels and at the Navy Towing Basin in Washington, D. C. Scientific articles covering the amazing propeller were published in technical magazines, but in this country there was no further response to this revolutionary idea.

In Austria, however, the idea took form and the Voith-Schneider Company began to apply cycloidal propulsion to marine vessels as early as 1928. In the late fall of 1944, the United States Government became interested in this form of propulsion. Early in 1945, the U. S. Army and the U. S. Navy decided to investigate cycloidal propulsion and the U. S. Army ordered the alteration of a harbor tow boat to be equipped wtih cycloidal propellers of the variable pitch type.

The LSM-458 selected for this experiment is a vessel of 914 tons sea going displacement, 203 feet long and a 34 foot beam. It is powered by two General Motors Model 16-278A Diesel engines, generating 1800 hp. at 800 shaft rpm.

The propellers have an orbit diameter of 7 feet and are equipped with 6 blades each which are cast hollow of manganese bronze. The propeller rotor, which carries the blades, is driven through a unique spiral bevel gear drive invented by Professor Kirsten and built by Gleason Gear Works of Rochester, N. Y. The pinion shaft is directly connected to the engine shaft by a flexible coupling and consists of an inner pinion integral with the shaft and an outer pinion keyed to the shaft. These two pinions on the same shaft drive two spiral bevel ring gears mounted on a common spider which in turn is keyed to and drives the rotor shaft. The gear system is so designed that the pinion shaft is mounted on roller bearings and is free to float endwise. The spiral angle of the gears is cut opposite and of the proper relation to proportion the gear loads correctly and balance the pinion thrust. The gear drive might be considered the same as a herringbone gear drive but with the use of spiral bevel gears. The reduction from the engine shaft to the rotor shaft is 6½:1.

The pilot house control stand aboard the LSM-458 combines steering and engine controls.



Note the "Cycloidal" insignia on the LSM's conning tower.

One of the cycloidal propellers being lowered aboard the Navy ship.

Here the LSM is completing a 3600° turn with an approximately zero radius. This is one of the amazing features of cycloidal propulsion.

The blade mechanism consists of a central control shaft which mounts the sun gear in the rotor and is normally stationary except when used for steering. Three idler gears mesh with the sun gear, and each idler meshes with two blade gears. As the rotor turns, the blades revolve around their own axes at one-half the rotor speed; the ratio between the blade gears and th sun gear being 2:1. The blades mount vertically on their spindles and turn on their axes, while the propeller as a whole, revolves around its center shaft. This rotative motion of the blade is controlled so that each blade produces a useful thrust during practically its entire revolution on its orbit.

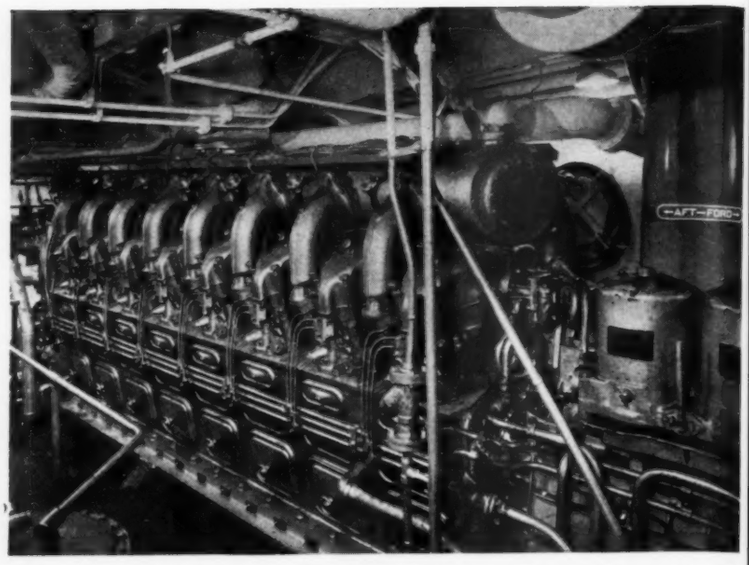
By virtue of its steering control, the propeller thrust may be directed any direction radially outward from the propeller shaft. Thus the ship may be rapidly reversed by turning the control through 180 degrees without altering the direction of rotation of the rotor. Consequently, the necessity of a reverse gear is eliminated, and its weight and cost are a great saving.

The double blade seals are constantly under oil pressure even when the propeller is stationary, a constant head is maintained in excess of the external water pressure to insure no leakage of water into the propeller. The main shaft seal consists of three parts. Water is circulated between the two lower units for lubrication, and an oil pressure is maintained between the two upper units similar to the blade seals. Any leakage which might occur has no chance of entrance into the mechanism but may be spotted by entrance into the bilge.

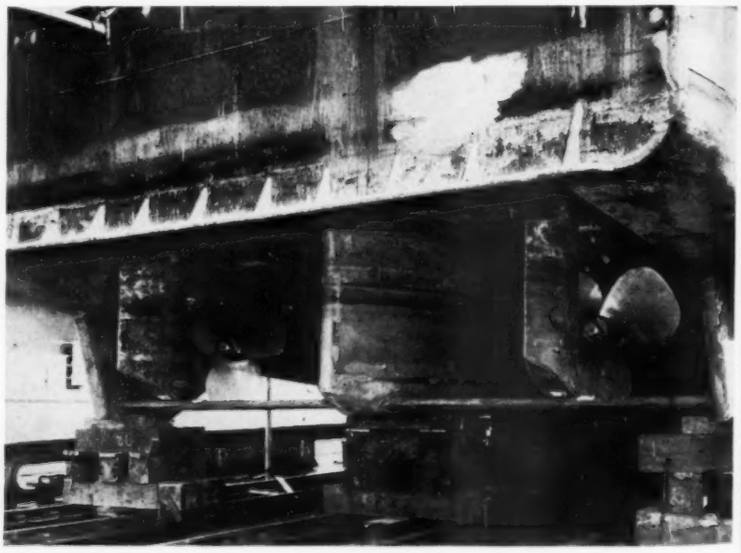
The steering is accomplished in the propeller by the control shaft, which when turned by the worm and worm gear on the top, shifts the axis of symmetry of the propeller, and all blades impart their thrust in a new direction.

The propeller controls are fully pneumatic and were designed by the Westinghouse Air Brake Co. of Wilmerding, Pa. At the same time, the engine controls were converted to pneumatic and combined with the propeller controls in the same stand on the bridge. Complete vessel control is now possible from the bridge.

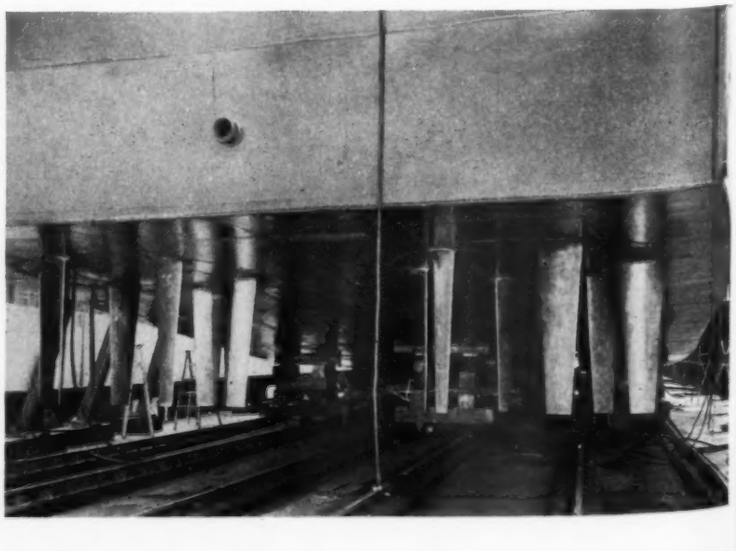
The use of cycloidal propellers provides a clean, undisturbed flow along the hull bottom. The higher operating efficiencies are partly explained by the cleaner and smoother hull shape. It is at once apparent that the cost of the cycloidal ship hull is reduced by the simpler construction.



Port engine installation aboard the LSM. She is powered with two of these General Motors 1800 hp. Diesels.



The picture above shows the hull of the LSM prior to the installation of cycloidal propulsion. The lower picture shows the improved hull lines after the installation was made.



TWENTY-THREE years of economical, dependable and satisfactory service of a Diesel engine powering the flour mill of the C. C. Groff Milling Company, Cincinnati, Ohio, have impressed more and more deeply on R. L. Groff, owner and operator, that "Father was right."

The Groff family bought the mill in 1911. There had been a mill on the site—in Mt. Healthy, a suburb, to be exact—for 75 or more years, since way back in Grant's Administration at least. The mill, when the Groffs acquired it, was operated by a 75 horsepower steam plant. Water power from a stream near by had preceded the steam era. Twelve years of intimacy with that steam plant convinced C. C. Groff, head of the family, that it should be replaced by cheaper, more dependable power. It was inefficient. It took too long to get steam up in the morning and so caused much loss of time, and it required employing a fireman to tend it.

So Mr. Groff, Senior, and his sons, James E. and R. L., all partners in the mill, looked into various other sources of power with a view to making the change. They crossed out a steam plant at the start, if only because of that need for a fireman. They asked a local power utility to submit data on cost of purchased energy. Father Groff consulted several Diesel enginemakers. He had heard that a Diesel would virtually run itself, at low cost, and would need no fireman.

The decision reached was to buy a Diesel engine. It was one of the most important decisions ever made for the mill. R. L. Groff recalls that at the time he himself favored the power company's proposal but was overruled by his father.

Events have proved that his father was right, and the son testifies to that rightness today. The steam plant gave way, in 1923, to a single cylinder, 50 hp., Type YV, heavy-duty Diesel engine, with mechanical drive, supplied by Fairbanks, Morse & Co. That engine has been operating ever since. Providing ample power every year at low cost of operation and maintenance, a cost less than the wages of the steam plant's fireman, it has paid for itself more than seven times in money saved. Besides, it promises to continue that rate of saving for years to come. The engine cost $4,500. The total savings for 22 years are estimated at $33,000.

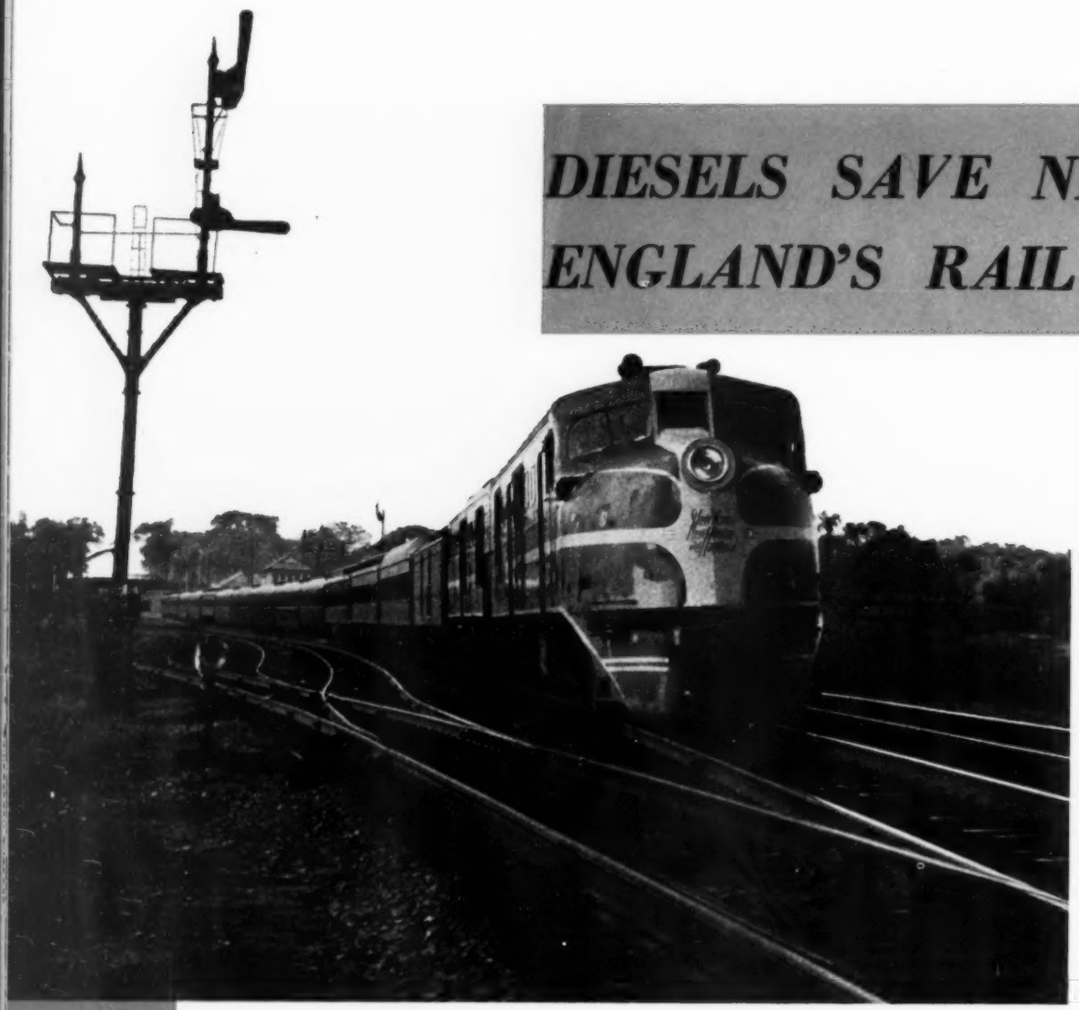
The Diesel in the Groff mill runs an average of 400 hours a month at a fuel cost of about $70; other costs, for operation and maintenance, may bring the yearly total up to around $1,000. Multiply by 22, for full years, that estimated saving of, say, $1500 yearly over prevailing utility rates.

The miller looks after the maintenance of the engine. He says it takes him only two or three minutes a day to start it and get the mill going. Once in a while, in his spare time, he wipes the engine off. He thinks a lot of that old engine, knows of nothing to compare with it.

Only one major repair job is recorded against the engine, installation of a new cylinder in 1938. The replacement wasn't absolutely necessary at the time, according to R. L. Groff, as the old cylinder was only a little bit cracked and was doing all right. Still, he wanted the engine kept in first-class condition. The replacement cost $385. After it, the engine ran "like new."

Other Fairbanks, Morse & Co. equipment, auxiliary to the engine, includes an air compressor for starting it. A 1,000 gph. self-oiling Typhoon pump recirculates cooling water between the engine and the outside cooling tower.

DIESELS SAVE NEW ENGLAND'S RAIL SERVICE



One of the 4,000 hp. New Haven Diesel-electrics hauling a fast passenger train.

BACK in August 1931 when the New Haven Railroad was testing its first Diesel-electric locomotive, few people took the innovation seriously. But to view the total of 116 Diesel switchers and road locomotives that are now in operation for the railroad and to consider the total Diesel horsepower output of 59,000, a different light is cast on that pioneer Diesel.

Already the New Haven Railroad stands third from the top in the list of Dieselized railroads and is surging towards first place with orders being filled for 24 more switchers and 30 more road locomotives which will bring the road's total up to 170 Diesel units.

The greatest strides in the Dieselization program have been made since 1941 when the first Diesel freight-passenger locomotives were placed in service. So versatile did these 4,000 hp. Diesel-electrics prove that today they may be seen hauling the New Haven's crack flyer, "The Yankee Clipper" to New Haven going one direction and on the return pulling a heavy freight.

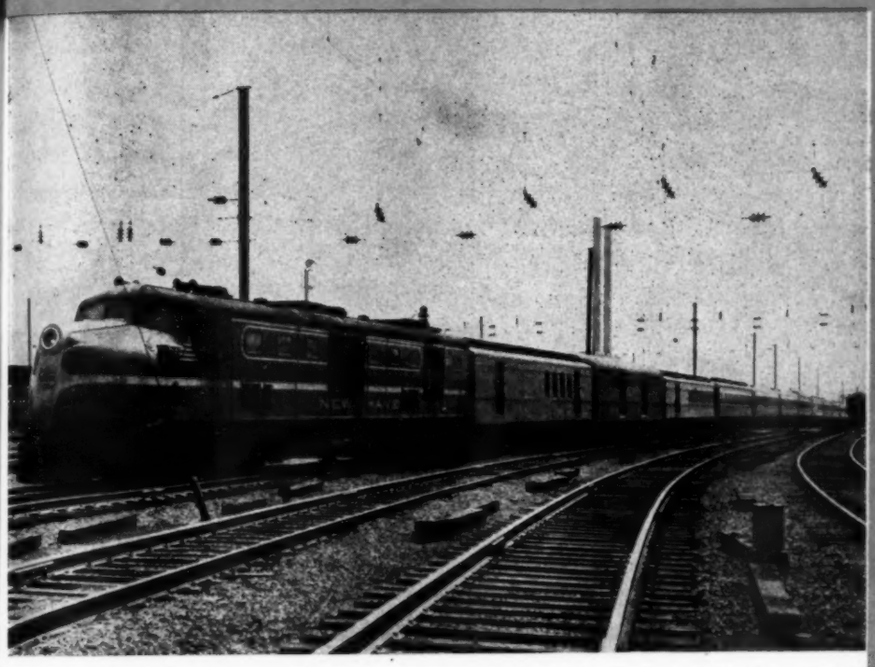
This versatility proved a Godsend during the recent coal shortage when most railroads had to cut passenger and freight service to a minimum. With 30 dual-unit Diesel electrics in operation it was simple to utilize each of the two units as separate locomotives. Thus sixty locomotives were available for the emergency. In addition, Diesel switchers were pressed into service for the commuter runs out of Boston. The road's freight service was not affected by the coal tieup either and the New Haven system was authorized by the government to accept freight at any of its stations for delivery over Diesel or electric served railroads.

The first Diesel purchased by the New Haven line was a 600 hp. Diesel switcher built by the American Locomotive Company. It was delivered in 1931 and is still in service today. The next step in Diesel came with the Comet in 1935, which was a 3-car, articulated, streamlined train with Diesel electric power pla

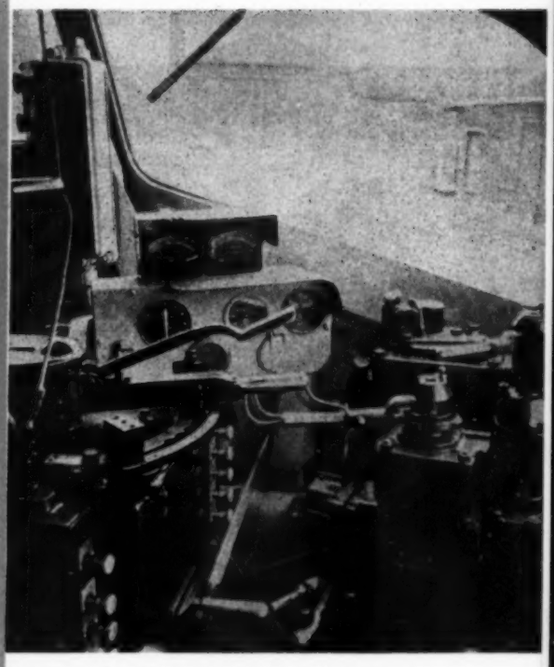
Following the Comet came ten more sw engines powered by interchangeable Coop Bessemer and Ingersoll-Rand Diesels. T interchangeability of power plants was an i novation in the field of Diesel locomoti

In 1938 20 Diesel switchers were in serv and by 1940 there were 35. To date there a 110 of these indispensable engines in operati

The Diesel road locomotives were introduc in December 1941. Now there is a fleet of 5 As generally used two 2000 hp. units a coupled back to back to form a 4000 hp. lo motive capable of operation from either en Each unit is powered by two Diesels drivi generators. The Diesels are 6 cylinder, 4 cy in line engines with a 12½ in. bore and 15 i stroke and a full load speed of 740 rpm. The were built by the American Locomotive Com pany. The engines are direct-connected to 6 volt, railway-type, traction generators.



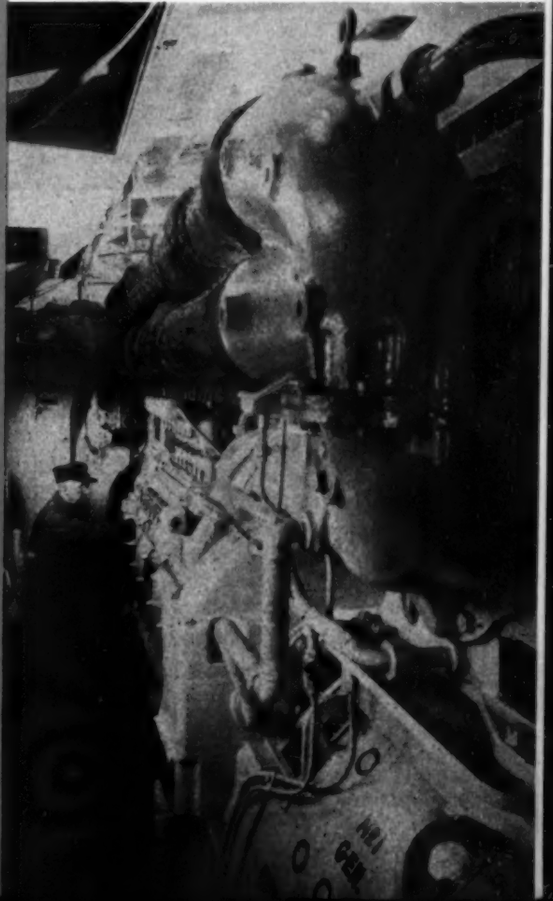
Pulling this passenger train during the recent coal shortage is a single 2,000 hp. unit Diesel locomotive. Usually they operate in pairs.

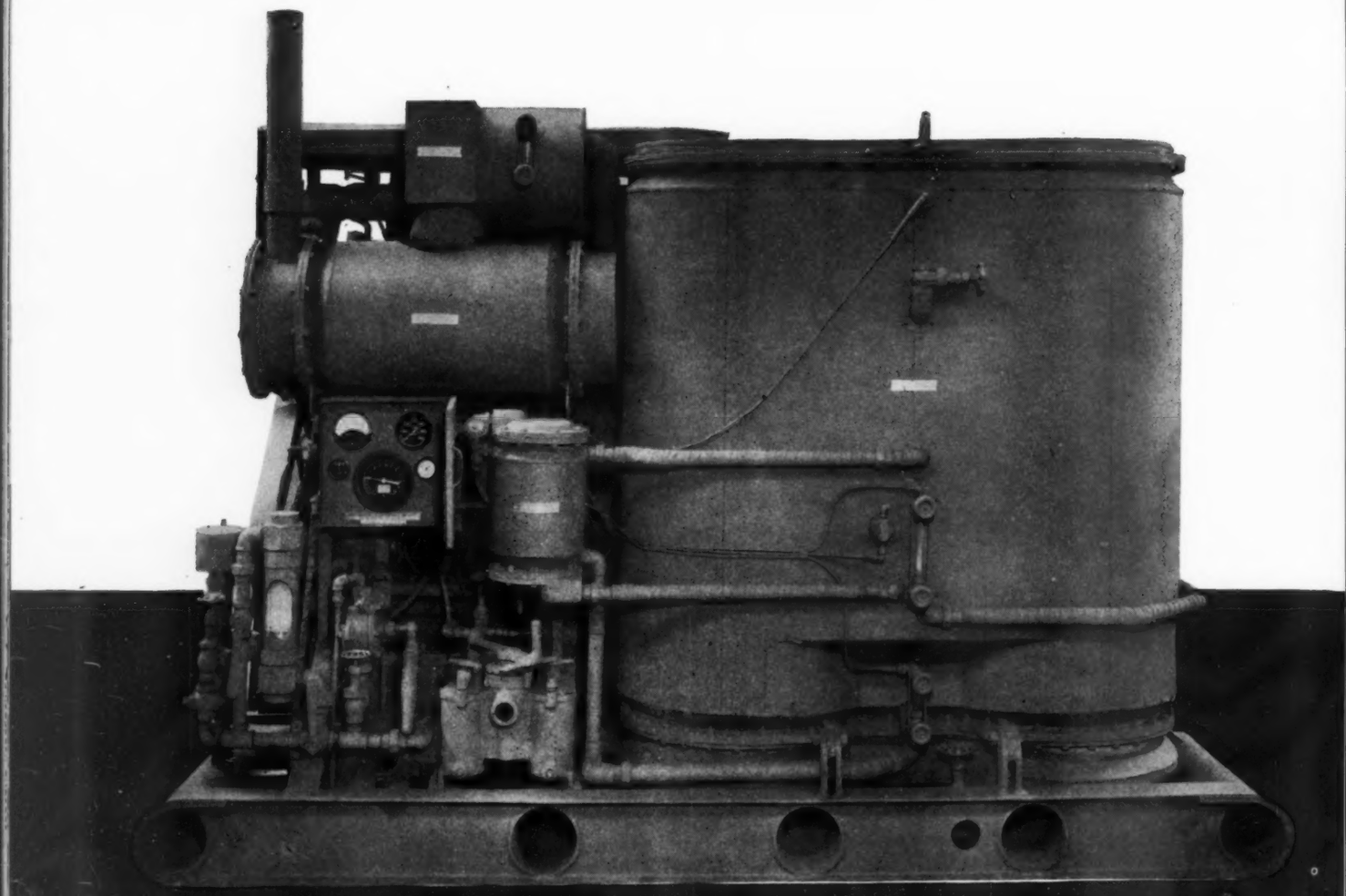


View of the cab of one of the big Diesel locomotives showing control station.

Engine room picture of a 2,000 hp. unit showing one of the 1,000 hp. Alco Diesels. There are two of these engines in each unit.

Here a Diesel switcher has just pulled into South Station with a trainload of commuters.





COMPACT DISTILLATION UNIT DIESEL-OPERATED

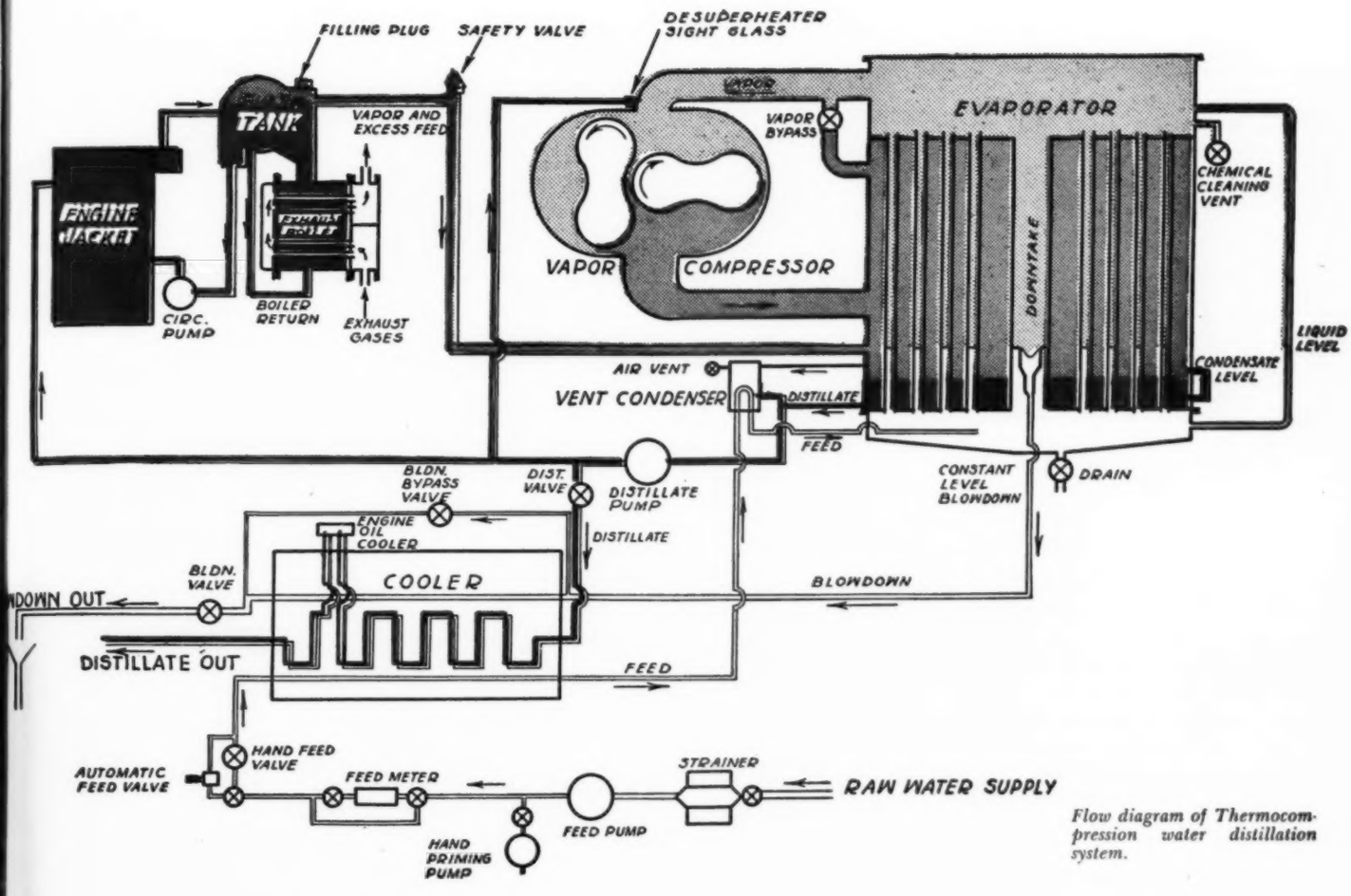
DURING the war a great need arose for water, pure drinking water, free from the typhus bacillae of Italy and Africa and the cholera organism of India and the south seas. The Army and Navy found the answer in portable distillation units which could operate self sufficiently and which could supply water quickly with minimum fuel consumption.

The Mechanical Equipment Company of New Orleans, working with the Army and Navy, developed these units and now is producing them for civilian use.

The units are portable (skid-mounted), completely self-contained, ruggedly constructed, and simple to operate and maintain. They can be obtained with any type of engine or electric motor drive; and with the small amount of heat necessary furnished by engine jacket and exhaust, or electric immersion heaters, or small oil fired boiler, or by customer's steam. Present units in production are 300 gph. and 60 gph. capacities.

The only method of converting sea water and many other forms of raw water to pure drinking water in large quantities is by means of distillation. The heat efficiency of conventional systems is that produced by a triple effect evaporator—which will provide about 36 gallons of pure distilled water per gallon of fuel oil. The unit pictured produces 240 gallons of water per gallon of fuel oil.

The idea of mechanically compressing vapor for evaporating purposes is old, dating from 1840. However, though many attempts were made and many thermocompression systems designed and manufactured, few operated at much better than double effect evaporator efficiency, and none come near the efficiency of the system shown herein. The secret of the great efficiency of the thermocompression system is that the heat used to distill the raw water is circulated and retained within the system. There is no condensing water and therefore no heat thrown away in condensing water.



Flow diagram of Thermocompression water distillation system.

In the unit pictured, the heat obtained from the combustion of fuel in the engine is used in the evaporator to boil or distill the pure water from the raw water. This heat is kept in the system and used continuously by compressing the vapor. The high efficiency of the system is due to the flow arrangement and the engineering design of the component parts. As the flow diagram shows a Diesel engine provides power to drive the vapor compressor and the feed and distillate pumps, and supplies heat to the system. It can be seen that the heat from the engine jacket, as well as the exhaust gases, are both used to produce the final result—distilled water. This recovery of a large percentage of the heat value of the fuel adds to the exceptional efficiency of the engine powered type unit. The engine operates with a closed fresh water cooling system. Actually, the jacket water is maintained under pressure by the circulating pump, and operating temperature is about 230°F. It has been found that this high jacket temperature, with the large circulation provided, results in less wear in the reciprocating and rotating parts of the engine, due to more uniform temperature and expansion throughout the engine. Since the engine cylinder walls are above normal temperatures, less cooling of the products of combustion takes place and the engine actually operates with a lower fuel rate than it would under corresponding load conditions with normal jacket temperatures. The lubricating oil is maintained at normal operating temperatures in order to insure good lubrication. The higher jacket temperature prevents condensation and actually adds to the life and cleanliness of the oil.

The vapor compressor pumps the vapor generated from the raw water inside of evaporator tubes into the steam chest of the evaporator, outside of the tubes, at a higher pressure and temperature. Thus the latent heat necessary to evaporate the raw water is passed back from the vapor to the raw water and produces more vapor from the raw water as the vapor condenses on the outsides of the tube. Thus the latent heat of evaporation is circulated within the system. The heat losses from the system as a whole are radiation and the small amount of heat which is impossible to recover from the flowdown and distillate with the feed, due to the necessary terminal differences in the cooler. Since no condensing water is required with this system, only a small amount of raw water is required (about 12 gpm. maximum for a 300 gph unit).

The units are designed to operate continuously and automatically for 30 days on sea water between cleanings. The unit becomes scaled inside of its straight heat transfer tubes from the impurities in the water over long periods of operation and must be cleaned when the maximum allowable scaled condition is reached. The length of time between cleanings depends upon the type and quantity of impurities in the raw water. The unit can be chemically cleaned in several hours with inexpensive chemicals easily obtained, while still producing distilled water; or it can be mechanically cleaned by means of the tube cleaning equipment supplied with the tools.

Safety controls are provided to protect the engine against low oil pressure or failure of its cooling system, and to protect the distilled water from becoming contaminated by the raw water. Other systems are also adequately protected.

CHEMICAL CLEANING METHODS

By LOYD SOMERS*

DIESEL engine overhaul has become a precision operation at the Shepherd Tractor and Equipment Company in Los Angeles. Every part of the job has come under the critical scrutiny of the Service Department and a system of overhauling and rebuilding Diesel engines and heavy equipment has been developed that turns out work that looks and performs like new.

Among the time and money-consuming operations that have been brought to light, studied and improved is cleaning. Hundreds of man hours are wasted in many Diesel overhaul plants because manual methods of removing grease, mud, tar, carbon and rust are still in use.

By installing a scientific, planned cleaning department we have increased the quality of our work, cut costs and speeded up production. Mechanics now devote their entire time to the critical operations of fitting, adjusting and assembling while unskilled help, with the aid of specially designed tanks, equipment and chemical cleaning materials, do the dirty work.

In these parts-scarce days we have been able to reclaim many usable parts which formerly were scrapped simply because the cost of cleaning them by manual methods was prohibitive.

During the past few years chemical cleaning compound manufacturers have devoted intensive research to the problem of eliminating manual drudgery from industrial cleaning. A review of the many new materials now available will be a revelation to anyone who is now removing scale, rust, paint, grease and oil by scraping, chipping, scouring or cleaning by hand.

When Diesel equipment comes into our shop for overhaul we can determine quickly how it should be cleaned. If it is only coated with ordinary grease, caked-dirt and grime, it can be thoroughly washed with a heavy-duty steam cleaning compound applied through a Chemical Vapor Cleaner.

Steam cleaning combines the natural cleansing force of live steam with the detergent action of a specialized cleaning compound and the pressure of the cutting spray.

Choice of a proper compound for use in steam cleaning is of vital importance. This compound must have vigorous penetrating and emulsifying action, be able to condition hard water and prevent the deposit of water scale which clogs coils and other parts. It must be designed so that it will not react to form sticky, hard-to-rinse curds or leave chalky streaks and deposits. The compound should be non-toxic and fume-free because most steam cleaning is an indoor operation.

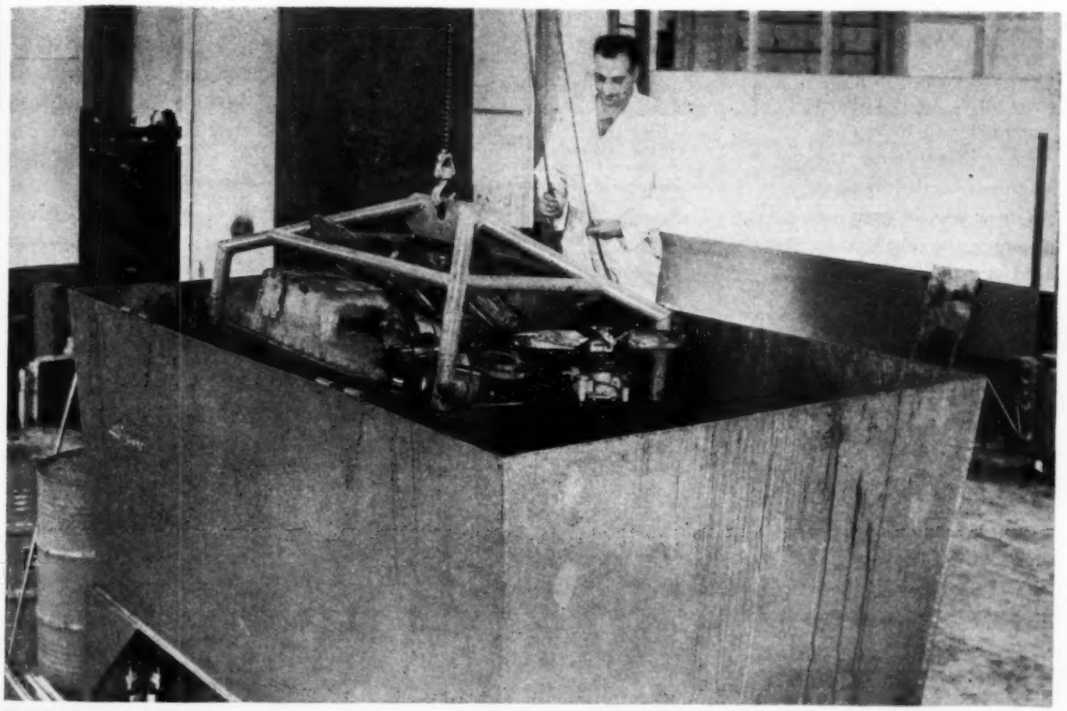
If, in addition to run-of-the-mill grease and grime, the equipment is caked with more stubborn soils such as tar and asphalt, we give it a preliminary soak with Turco Composition 9. This brown liquid, which can be applied through a spray gun, will penetrate and loosen the most obdurate deposits so they will rinse easily with the steam vapor spray.

* *Service Manager, Shepherd Tractor and Equipment Company.*

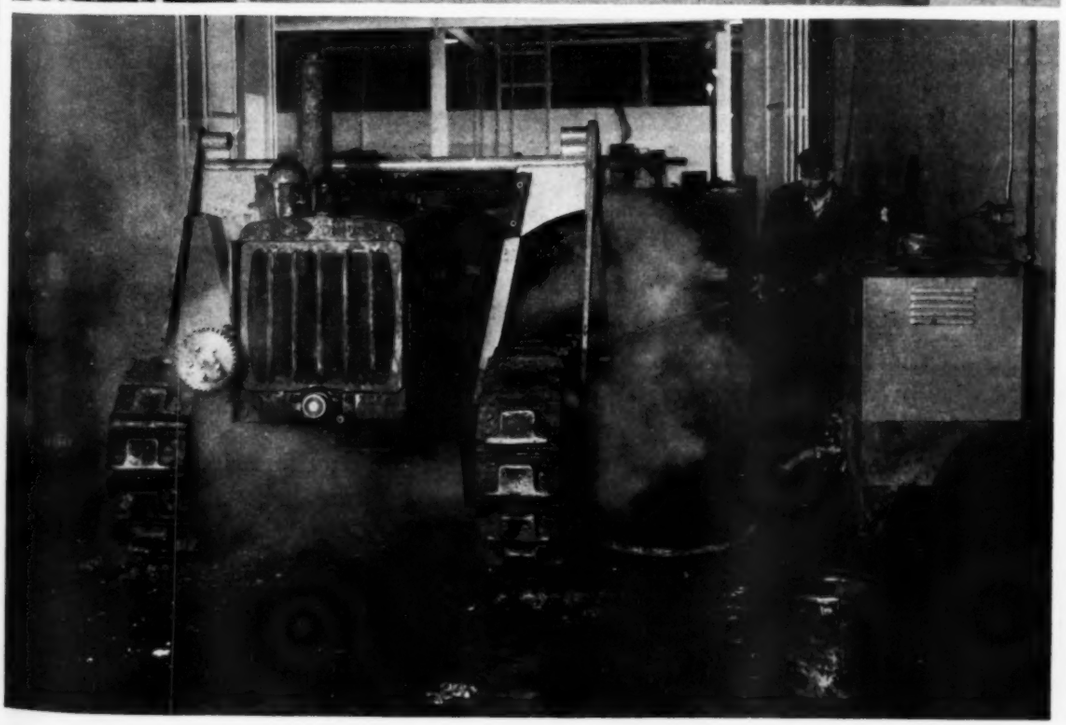
Steam cleaning room at Shepherd Tractor Company. Dirty parts are sprayed with chemical cleaner then rinsed with steam to insure proper cleansing.

Chemical vapor spray is being used here to remove grease, oil, tar and asphalt from tractor chassis.

SPEED DIESEL OVERHAUL



Carbon, baked-on engine varnish and other adhesive soils are removed from engine parts by immersion in this chemical cleaning tank at Shepherd.



This illustration shows the initial stage in Shepherd's cleaning process, a thorough steam cleaning. This saves much time in the disassembly process.

It is safe to say that the steam room is one of the busiest spots in our entire plant. As the disassembly process goes forward all types of parts and assemblies are taken there to have oil and grease removed. This job usually consists of a quick steam bath and a water rinse. The whole process takes an unbelievably short time and the results pay real dividends. The repair work is not only speeded up but the parts can be accurately inspected for fracture, excessive wear and inherent flaws.

Engine varnish, baked-on carbon and other heat hardened substances thrive inside a Diesel engine. It is almost impossible to remove them by hand with any degree of thoroughness. The best method of cleaning parts affected by these deposits is a cold soak in a tank of powerful cleaner followed by a steam rinse. The cleaner, Turco Fuzee, is a blend of powerful synthetic solvents topped by a floating liquid seal which prevents evaporation and insures long life and strength to the solution. The same tank of fluid may be used time and time again with equally good results. Carbon, paint, grease and sticky gums can be removed from parts without damage to the base materials.

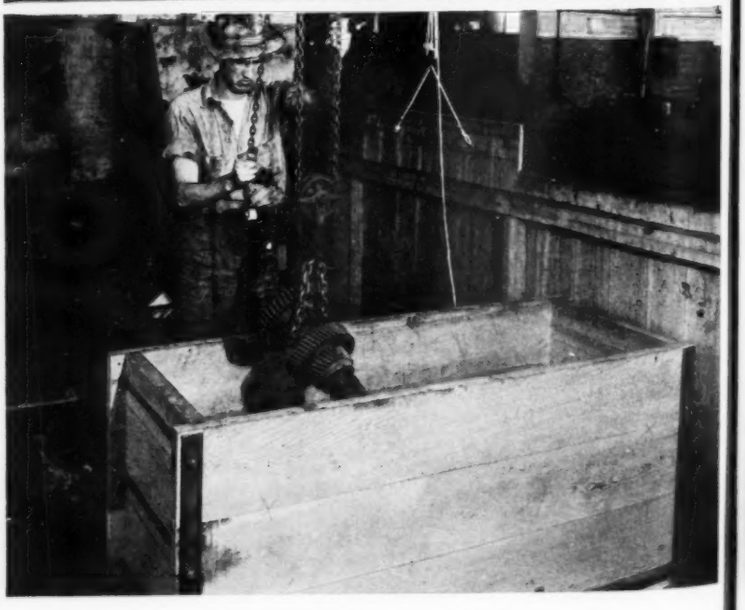
All the Diesel engines which come to our shop for overhaul are found to have their engine heads and blocks either wholly or partially affected by hard water scale such as accumulates in any cooling system. This obstinate dirt is harmful to the engine as it prevents proper circulation and heat transfer. It cannot be removed by manual methods. De-Scaler is our solution to this problem. A highly inhibited compound, it is mixed with the proper amount of water in a tank to eat the scale. It is harmless to metals under normal soaking conditions and leaves surfaces smooth, clean and unpitted. Some types of water scale contain stubborn deposits of silica. This cannot be removed by De-Scaler alone. When such deposits are present they require the addition of a small amount of Silisol to loosen and remove them. Silisol is an odorless, white, granular compound which dissolves instantly in the De-Scaler solution. Parts to be de-scaled are soaked for the required amount of time and then washed in warm water with a neutralizing agent before they are reassembled or repaired.

As soon as all the parts have been inspected, cleaned and restored to working condition the engine is reassembled and tested. When the running test has been completed we give the machine a good substantial paint job and send it back to the field where it can perform as well as when it was new.

Water scale is removed from cylinder head jackets by immersion in de-scaling compound. Compare the block being immersed with the block already cleaned.

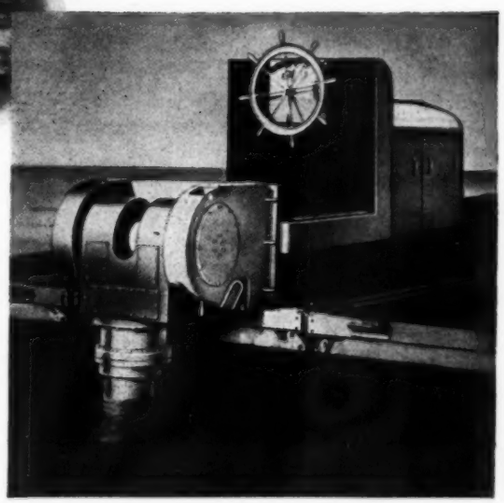
(Below) A Caterpillar tractor completely overhauled and with a new coat of paint after a Shepherd job.

(Bottom) Rusty parts are restored to active service by treatment in De-scaler compound. A wooden tank is used to combat the action of the strong acid solution.



Illustrated: workboat 46' long, equipped with 110 H. P. "Harbormaster"

THE HARBORMASTER WORKBOAT



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DIESELS AND THE OIL INDUSTRY

By A. W. McKINNEY

Editor's Note: This article is the reprint of an address by A. W. McKinney, Toledo, Ohio, Vice-President and General Manager of Sales of the National Supply Company, delivered at the recent annual meeting of the Oil and Gas Division of the American Society of Mechanical Engineers at Milwaukee, Wisconsin.

THERE is no greater paradox in all business than the fact that the very industry *responsible* for the birth of the Diesel engine still is almost a virgin field for the use of those Diesels, for without oil there could have been no Diesels. The oil industry is awakening to the fact that, in the past, it has not taken full advantage of the engine it sired more than half a century ago. There are sound, logical reasons both for the engine's earlier lack of acceptance, and the present increasing appreciation of its worth in all branches of the oil industry.

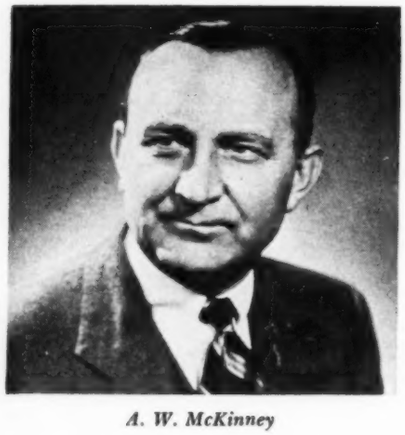
In years past, there has been an abundance of cheap gas fuel available for gas engines and steam boilers in practically all oil fields. Then it was more economical for the operator to use a source of power utilizing what was considered the cheapest fuel. This picture now is changing. It is being learned that the natural gas actually is not so cheap as had been believed. New uses found for natural gas have increased its value to a point where Diesel fuel can offer it very stiff competition. Diesel fuel has not become cheaper, but natural gas has become more expensive.

There are two comparatively recent technical advances responsible for this increased value of natural gas. The most important of these is the large number of gas conservation projects that are under way. Actually, these are not gas "conservation" projects, but gas *utilization* projects, because the gas is returned under pressure to the formations so that it can continue its primary and vital function of helping to bring the oil to the surface.

The other important change in the natural gas picture is its expanding use in the liquid fuel and the plastic and chemical industries. Natural gas is just on the threshold in these industries, and its use will expand tremendously. These developments are causing oil operators to revise their opinions as to the value and proper utilization of natural gas, particularly that which is produced along with oil. For this reason, the engineering departments of the oil companies almost overnight have become intensely interested in Diesels, and are collecting operating experience on these engines to fit them into their long-range programs of gas conservation.

This trend had started before the war, but when the armed forces not only took practically the entire output of Diesels, but expanded production of the engines more than twenty times over the prewar level, this trend was interrupted. Now, there not only is this backlog for the Diesel engine manufacturers to fill, but the increased new demand.

There are, of course, other factors than the newly-found uses for natural gas that are affecting the heavy demand for Diesels in the oil



A. W. McKinney

industry. There have been important improvements in the design of Diesel engines in recent years. Among the more important of these is the improved power-to-weight ratio which allows greater mobility of the engines. Another improvement has been the production of dual-fuel equipment which allows an engine to be changed from Diesel fuel to gas, or vice versa. This is especially practical in the oil industry where fuel conditions so often are subject to change.

Increased familiarity of oil field workers with Diesel engines will be a powerful factor in their more ready acceptance. During the war thousands of men from the oil fields became familiar with the work of Diesels for practically every type of war-time operation. Many of them were specially trained in Diesel engine operation and repair.

There are five general applications of Diesel engines in the oil industry.

1. Drilling operations
2. Pumping and repressuring wells
3. Pipe line operations
4. Refining operations
5. Exploration and transportation vessels and vehicles.

In some of these fields, of course, their use is more practical than in others. The use of Diesels in rotary drilling operations unquestionably is the most important. Somewhat more than half of the four thousand drilling rigs in the country are rotary outfits, but only a few of these now are powered by Diesels. In the past, natural gas had been cheap and plentiful, and where it was not, butane could be obtained. The story is different now—more and more of these rigs will become Dieselized. In drilling operations ,there is another very important reason why Diesels will become more widely used. Many wells now are being drilled to 10,000 feet or deeper, and the majority of rigs now in use are not of sufficient power and capacity to drill economically to such depths. The demand is increasing, therefore, for heavy duty rigs. Some of these require 1000 hp. or more on the hoisting drum and have a regular capacity of 12,000 to 15,000 feet.

Since drilling costs increase greatly the deeper the well, operators have to take advantage of every possible economy. It has been found that one of the most important economies that can be instituted is the use of a multiple arrangement of Diesel engines to provide the required combination of operating economy, power and portability.

The number of engines used on such rigs necessarily varies with the capacity and power requirements. For moderately deep drilling, some rigs have three Diesel engines in multiple arrangement. Capacity requirements of other rigs may require as many as seven engines, four on the draw works and No. 1 power slush pump, two on the No. 2 power slush pump, and one of the stand-by type draw works.

. . . . *And now please turn to page 75* . . . .

DIESEL ENGINES IN STATIONARY USAGE

By R. H. MORSE JR.

An address by R. H. Morse, Jr., Vice President and General Sales Manager, Fairbanks, Morse & Co., delivered at the 18th Annual Oil & Gas Power Conference, Milwaukee, June 12-13, 1946.

IN the early days of the Diesel, every factory with a smoking chimney or bank of power transformers in its yard was pointed out to the Diesel salesman as a potential customer for his wares. More recently, we have come to realize that we should analyze carefully the power use and power needs of each individual prospect before we break the news to him that he should haul down his chimney or throw away his transformers because he can be better served by Diesels.

Our competitors are steam power and hydro-electric power. Each of them has advantages if the job to be done can be tailor-made to these advantages. Each of them has weaknesses, and it's up to the Diesel salesman to uncover these weaknesses and use them to his advantage. The performance of a stationary Diesel is highly predictable. We know in advance almost exactly what it will do and how much it will cost to run. If our prospective customer is efficiency-minded, he will have kept accurate figures of the power costs on which he hopes to improve, and the job of selling him a Diesel becomes the simple comparison of one set of known facts with another. Either he will be better off with a Diesel—or he won't. The figures will tell the story, and the result will be an easy sale or a quick look for a new prospect without further waste of time.

This kind of salesmanship requires research and painstaking advance preparation rather than fast talking and emotional appeal, and its success is evidenced by the continually expanding field of stationary Diesel applications. The reliability, dependability, splendid fuel economy and long life of the modern stationary Diesel engine are too well recognized to merit comment in a meeting of this nature. Not so often expressed but equally worthy of mention are two other features of the Diesel especially advantageous in stationary applications. *The first* is that a Diesel unit will go into operation, carrying its full load, in a very short time. *The second* is that the high standard of Diesel economy is attained regardless of the size of the unit.

R. H. Morse, Jr.

It is estimated that there are today between five and six million horsepower of stationary Diesel engines in use in the United States, and this figure does not include the engines which were supplied to meet the requirements of our armed forces. Seventy-two per cent of this five or six million horsepower total is distributed as follows: municipal power plants are using twenty-seven per cent; private utilities and R.E.A. co-operatives take fourteen per cent; twelve per cent are on the oil pipe lines and otherwise working for the oil industry; cotton gins and oil mills account for eight per cent; the grain industry is using six per cent; the remaining five per cent of the accountable seventy-two are at work making ice and providing other refrigeration. The miscellaneous unclassified twenty-eight per cent is scattered through industries such as mining, rock and clay products, textile mills, lumber and woodworking, irrigation, metal working—and others.

With the vast improvement which has been made in the design and construction of today's Diesel engines, we believe that our industry can look forward to a continually increasing use of this source of power in each of these markets which we at present motivate. Modern trends in design are producing engines which are suited to jobs where the older and more cumbersome engines of earlier design can not compete economically with other sources of power supply.

Present day Diesels lend themselves more readily than their forebears to satisfactory installation in city buildings. The higher rotative speed now offered by the industry results not only in a reduction of the space required for proper installation of the unit but this greater speed also simplifies the problem of vibration isolation—always a real factor in engineering and planning city installations. If our industry is to sell aggressively, we should study and develop this market. It may prove to have a potential capacity way in excess of the municipal power market which for years past has been regarded as the principal and most secure outlet for stationary Diesel engines.

More attention, too, should be devoted to efficient utilization of that Diesel power by-product—heat. The possibilities for waste heat recovery and utilization are just beginning to be appreciated, and for all our smug boasts of the efficiency of our product, we should not ourselves forget that we throw away better than sixty Btu. of energy for every forty that we convert into motive power. Better engineering and more research will expand the applications of heat recovery, and widen the Diesel's field of profitable application.

While the municipal electric light plants have been absorbing a large percentage of our industry's engine production, not very much attention has yet been directed toward developing the market for pumping the municipal water supply with the same kind of power. The Diesel is ideally suited to this service, and there is no stationary application where the Diesel can show to better advantage than pumping a community water supply.

An outstanding example is to be found at Burlington, Vermont. Here the city operates a municipal electric light plant on cheap and abundant hydro power. Burlington's power cost is less than a cent per kilowatt hour—but the economy of a Diesel, operating under the nearly constant load which prevails in a water works pumping station, is so great that the City of Burlington finds it more economical to pump its water with a Diesel engine.

We are entering an era that will witness sweeping changes in the sanitary facilities of our municipalities throughout the country. Thousands of new municipal sewage treatment and

. . . . *And now please turn to page 77* . . . .

Conducted by R. L. GREGORY*

"TROUBLE SHOOTING"
PART 4

CONTINUING our discussion of "trouble shooting" let us delve farther into the irregularities of operation, which one is occasionally forced to face.

5. An engine suddenly knocks and slows down.

When this occurs, it is usually due to the overheating of some of the integral parts of the unit and these may be classified under the following headings:

(a) Bearing failure or difficulties.
(b) Hot crosshead or crosshead pin.
(c) Piston seizure due to:
(1) Insufficient or poor lubrication.
(2) Insufficient or poor cooling of liner walls.
(3) Improper cooling of piston.

In the case of a bearing failure, due warning is generally given by a rise of the lubricating oil temperature, and a gradual increase in the resultant knocking in a specific cylinder. Most units are, or at least should be, equipped with dial or other thermometers giving the temperature of the bearings and when one of these indicates an abnormal rise in temperature, the cause for such a rise should be traced out.

The same is true of the cross head and cross head pin, and while it is more difficult to determine this from the temperature standpoint, the knocking can be readily traced to its source as the piston travels in the stroke.

Piston seizure is generally due to one of the above three causes. All units have their limitations as to temperature while operating and these are generally specifically outlined by the manufacturer. There is some variance in opinion as to just what these limitations should really be, but suffice it to say, that it is good practice to operate a unit well under the maximum allowable temperatures, since one then has some leeway both in time and temperature to correct the difficulty and if caught in time serious damage can often be averted.

The matter of proper lubrication of the cylinder wall is most important and a sufficient film of lubricant must be maintained and that at temperatures within safe range at all times. Proper cooling depends a great deal upon the agent and the condiiton of the cooling system. On a closed system of cooling, with the cooling agent properly treated to keep scale and corrosion at a minimum, not much difficulty should be encountered. However many units are operated with an open system of cooling and here diligent observation must be maintained over both the cooling agent and the passages of the system.

Where water is obtained from a lake, river or pond, passed through the cooling system, and you are unable to properly treat it, you are heading into trouble. Seasonal changes have quite an effect on the degrees of hardness of such water, and where this occurs, scale formation is much more pronounced. The writer recently had the opportunity to inspect a unit with this method of cooling, and was very much surprised at the amount of rust, corrosion and scale which the cooling passages contained. Naturally improper cooling of the liner wall, has a disastrous effect on the lubricating film between the piston and the liner wall, since the properties of the lubricant cannot be maintained where excessive heat is present. This is also true as applied to piston cooling.

However, piston cooling involves more than merely keeping the lubricant at proper temperature. The design of the piston cooling system and the pressure maintained on the oil in passing through this system is also of importance and must be maintained in order to have the desired cooling effect on the piston head, which is directly subjected to the heat of combustion.

One rule is almost compulsory. When one runs into a situation such as any of the above mentioned irregularities, the unit should be removed from service as fast as feasibly possible. However in shutting it down, much depends upon the seriousness of the situation. If it is in what might be termed as the "first stage" of trouble, it may be possible to keep the trouble at a minimum amount, by cutting off the fuel to the affected piston and give it an excess amount of lubricant, until the liner and piston can be sufficiently cooled off. If, on the other hand, the seizure is in a more advanced stage and the heat excessive, the load can be removed, the unit shut down, the auxiliary lube oil pump started and if a motorized barring rig is used, continue to turn the unit over, with plenty of cylinder oil injected by operating the lubricator by hand until it is sufficiently cooled to stop entirely. This method has been used to prevent complete seizure and setting up of the piston to the cylinder wall. When this occurs the job of removing the piston becomes a real task, but if one can keep it from becoming a real seizure, while the piston and liner may be scored to such an extent that they are ruined for further operation, still the task of removing the piston from the liner is much simpler.

6. Knocking in the Cylinder.

This situation ofttimes occurs in various stages and is generally attributed to any one of the following causes:

(a) Fuel injection may be too early.
(b) Blast air may be too high.
(c) Fuel valve may be sticking.
(d) Broken fuel valve or fuel valve springs.
(e) Fuel check valve not functioning properly.

These are conditions which may occur at any time, such as a fuel valve becoming gummy and sticking, a fuel check valve being worn and ineffective in operation, a broken spring appearing or the improper setting of the blast governor, leaving the blast too high for a given load. Unless periodically inspected, cleaned and properly lubricated, the blast governor becomes gummy and sticky and does not function, opening up under heavy load and remaining too far open when the load diminishes.

Too early fuel injection will also cause this knock and can be remedied by proper adjustment. There are so many integral parts of a Diesel unit that may, if not operating properly cause these irregularities it behooves one with such units under his charge, to improve every opportunity to check such parts and keep them functioning properly.

* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*

A Simplified SK Strainer . . .

designed to give you more for your money

Here is a duplex strainer which does a thorough job of removing dirt and other foreign matter from oil, water and other liquids, *yet is moderately priced.* Design simplifications, standardization and construction economies all contribute to making this new strainer outstanding in many ways.

Check These Features:

DUPLEX DESIGN—
permits each strainer to be cleaned without flow interruption.

ONLY 1 VALVE—
single shut off cock with double-port provides continuous flow during switch-over and is pressure balanced for easy operation. Steel spring takes up any plug wear and insures against leakage.

VERTICAL BASKETS—
allow continuous flow while cleaning. Dirt is collected in the basket which is easily removed without loss of fluid. Strainer free area is a minimum of 5 times pipe area.

SINGLE-SETSCREW CLAMPS—
quickly removable, yet seal basket chambers tightly.

PACKING GLANDS—
nut-and-stud type, easy to adjust and will not corrode and "freeze."

PLUG DRAINS—
on basket chambers for draining fluid from unit.

Made of cast bronze, these SK Duplex Strainers are designed for pressures up to 125 psi, in pipe sizes from ½ to 2 inches. Being light-weight, they need no support other than the pipe line.

Other SK Strainers are made in cast iron for pressures up to 250 psi or steel for pressures up to 600 psi and sizes up to 6 inches.

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Exchange Your Diesel Maintenance Ideas

Conducted by R. L. GREGORY

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Gregory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

"Pilot Lights and Systematic Color Scheme of Identifying Pipe Lines as an Aid to Maintenance & Operation."

THIS department recently received a letter from a discharged Navy man, in which he discussed some of the inexpensive "gadgets" which some of the more modern plants are using, but which he believes every plant should install as an operating safety measure, and since one of these suggestions has a great deal of merit, we are passing it on to our readers. The particular item referred to is that of pilot lights on the auxiliary circuits.

As our reader explained, there are many plants throughout the country with several units installed, and ofttimes several of these units are in operation at once. Most of them have their own individual sets of auxiliaries, such as cooling pumps, soft water circulating pumps, oil filters; some have separate blowing equipment for scavenging air, etc.

With several units in operation with their attendant auxiliaries, the operator has considerable ground to cover, watching the functions of all the plant equipment and checking upon it constantly.

Therefore our reader suggests, that a series of pilot lights be placed in plain view, different units having different colored lights, and these pilot lights be so connected to the different auxiliaries, so that in case the auxiliary fails, the light will go out, indicating trouble. His contention being, that often these auxiliaries are placed in remote places in the basement, on galleries and even in separate buildings, a fuse on a motor might blow, or an overload kick out or a thermal couple become overheated and kick the motor operating the auxiliary off while the operator was otherwise engaged in some plant duty. Before he knew it, trouble would develop and with these lights located in plain view, it would be easier for him to check on auxiliary operation.

These pilot lights could even be used in conjunction with alarms, such as temperature alarms, pressure alarms, etc. and for the little expense in installing such a pilot light system, they are good insurance in warding off trouble, particularly in older plants where there are several units, and where modern safety alarms for the various function failures are not provided.

Another suggestion which our reader made, was the adoption of a systematic painting of all pipe lines, following the standardized color scheme for water, fuel, air, and lube oil lines. In many plants we often find a maze of piping, running up under ceilings, grouped close together and ofttimes in rather inaccessible places. If such piping were marked distinctively, it would be an easy matter to trace out the lines, without becoming confused in trying to do the job. And incidents occasionally arise which demand the tracing out of such lines, to open or close valves. This suggestion all has merit not only in helping designate lines, but it lends toward the keeping of a cleaner and neater plant, since the lines must be cleaned off occasionally in order that color identity may be maintained.

The system as utilized by the Navy is completely standardized, and results in increased efficiency and safety for plant operation. Operating personnel are quickly acquainted with all piping systems within a plant and are warned immediately of high pressure steam or gas lines. The system consists in banding all piping with various colors. Green, for instance is used for water lines with the number of bands denoting whether the water is salt, fresh, hot or cold. Oil lines are circled with varying numbers of red painted rings indicating Diesel fuel, lubricating oil or straight bunker oil. High pressure air lines are represented by still another color, as are refrigerant pipes. To amplify this marking system, in cases where piping is carried through walls or is under ground, a numbering system within each color classification may be utilized. If, say, two water pipes from a manifold pass underground for any distance they could be easily recognized by their color as water pipes when they reappeared but unless each one was numbered both at the manifold and at various points of emergence, the operator could not properly determine which pipe was which and in an emergency lose valuable time closing the proper valve.

Hans Lehrmann, Chief Engineer of the Lenox Hill Hospital in New York City, has undertaken an identification system of this type for the hospital plant. The building occupies a city block and it will be a big job but one well worth doing for it will pay off in the long run. Mr. Lehrmann, in addition, will diagram his system and post it for ready reference in his engine room.

Eliminating Dust and Fumes Around Filters

Often when charging filters with Fuller's earth, retrol, cranite or similar filtering agents, the air in the filtering room, basement and even the engine room becomes filled with the dust from the filtering agent. This is particularly true where the filters are near equipment in operation and the windage from the units scatters it throughout the plant, not only making it dusty, but sometimes it is very annoying to the respiratory organs.

Mr. Monson of the Fosston, Minnesota Municipal plant, says he has eliminated this nuisance by using a canvas cover over his filters when adding the filtering agent. This cover is equipped with an isinglass window, so that the operator can watch his equipment as he places the filtering agent in the filter, and at the same time the cover keeps the dust from being picked up and distributed over the room. This appears to be a good idea for eliminating this situation.

Another excellent idea which is used in many places, is to have the filters covered with a hood made of sheet metal. This hood is placed above the filter and a pipe leads to an induction fan, which picks up the dust and blows it to the outside. Another good point connected with such an arrangement is that the fumes from the hot oil are also picked up and dissipated to the outer atmosphere. Such an arrangement is very similar to that used over stoves in restaurants and in bakeries and when so arranged over your filter, particularly the batch type of filter, it proves very effective.

Diesels and the Oil Industry

. . . . *Continued from page 62* . . . .

Another important development that will stimulate Diesel sales in the oil industry is the steadily increasing marine and off-shore drilling operations, particularly along the Texas, Louisiana and California coasts. In this kind of operation, transportation of the fuel is an important consideration, and in this respect Diesel fuel has a distinct advantage and economy. In addition, Diesels are being used increasingly in the large number of service and auxiliary craft used in these marine operations.

That foreign sales of Diesel engines will be one of our biggest markets, is inevitable. The foreign oil industry will expand tremendously in the next few years. Although the United States has only about six per cent of the world's population, it produced more than sixty per cent of the world's oil in 1945. Our estimated share of the world's oil reserves is only 32 per cent.

American oil field machinery unquestionably will dominate this foreign field—and it will be largely Diesel-equipped for two primary reasons. Diesel engines have been the preferred source of power in foreign countries for many years. There will be an increasingly larger percentage of exploratory drilling, and fewer proven areas where gas is available for fuel.

Diesels also will play an increasingly important role in the production division of the oil industry. There is a growing trend in oil well pumping in the use of central engine-generator plants developing electric power to serve a number of wells in an area, each powered individually by electric motors. Since natural gas no longer is considered cheap and abundant, Diesels will replace many of the gas-powered installations. Dual-fuel equipment on these engines will permit their use in any territory, regardless of whether the most readily available fuel is oil or gas. Furthermore, a Diesel generator unit is portable.

Many Diesel engines have been used in the past in oil pipe line service as prime movers for the main pumps, usually using crude oil from the lines for fuel. Through this use, most of the trouble factors of operating Diesels on crude oil have been identified and eliminated. Both the pipe line companies and the Diesel manufacturers are continuing to carry on this research, and a greater market in pipe line service is expected for the Diesel engine.

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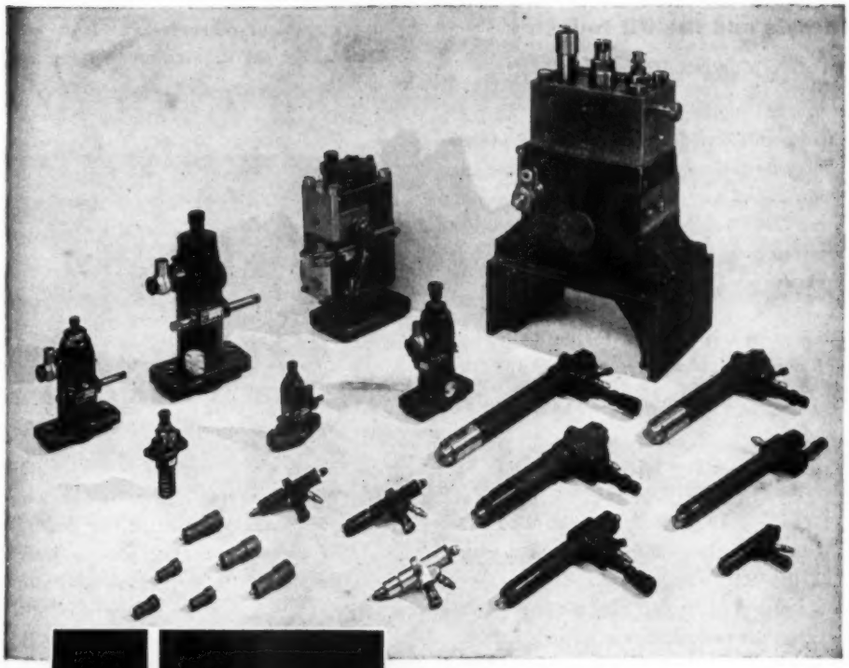
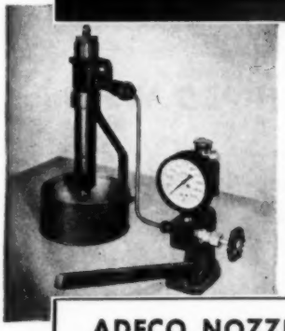


adeco . . .

YOUR SOURCE FOR DEPENDABLE FUEL INJECTION EQUIPMENT



Whether you need standard fuel injection equipment or special units built to your specifications, Adeco offers the logical source of supply.

Today's line of Adeco equipment, the outgrowth of long experience in serving the Diesel industry, includes: Standard fuel injection pumps in plunger diameters from 7 mm. to 31 mm.; a complete line of standard nozzles and nozzle holders, including the water-cooled type; and the Adeco nozzle tester.

All Adeco products are built to highest standards, with years of trouble-free operation behind them to testify to their reliability.

ADECO NOZZLE TESTER

For Low-Cost Maintenance

America's most widely used nozzle tester enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Compact, portable, sturdy, precision-built. Pressures up to 10,000 p.s.i. Tests both large and small injectors on bench or engine. Prevents costly delays and possible damage to engine. Standard or Navy-approved gauge. Ideal for testing hydraulic equipment. Write for bulletin.

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Diesels and the Oil Industry

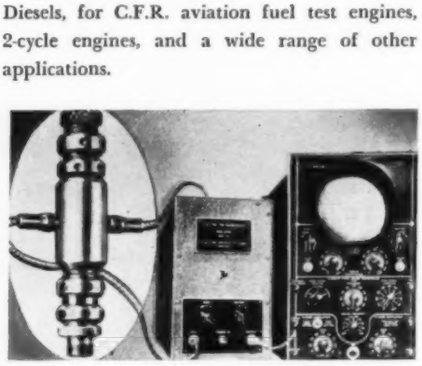
. . . . *Continued from page 75* . . . .

Even the refining division of the industry, where both electricity and steam, used in many refinery operations, are readily available, offers opportunities for the Diesel engine manufacturer. Some refineries use Diesels for driving large recycling pumps used in various refining processes.

These great new markets in the oil industry, both domestic and foreign, will keep the Diesel engine industry expanding.

New Pressuregraph Announced By Electro Products Laboratories

THE new Pressuregraph brought out by Electro Products Laboratories provides, with a Cathode Ray Oscillograph, a substantially linear pressure-time curve on the screen, which indicates the performance of any engine, pump, or other device subject to pressure variations. It is used for studies of all types of internal combustion engines, pumps, compressors, air and liquid pipe lines, etc. It shows the erratic operation of a device which normally cannot be observed by other means, due to inertia of fly-wheels, and other factors. It is used for Diesels, for C.F.R. aviation fuel test engines, 2-cycle engines, and a wide range of other applications.



New Pressuregraph with Cathode Ray Oscillograph.

Operation is simple. There is only one control. The pick-up is inserted in cylinder, chamber of airline, etc. The pick-up includes a diaphragm which, when acted on by pressure impulse, unbalances an electronic circuit. The unbalanced voltage from the pick-up is delivered to the Pressuregraph cabinet where it is amplified, and passed through a negative modulation suppressor, and then to the oscillograph. The sweep circuit of the oscillograph is adjusted to the speed of the engine of mechanism under test. A band of light appears on the screen, the contour or shape of which light is the true pressure-time curve. This band of light is not a line or tracing, but an area similar to that of a television picture, and easily readable.

Further details may be had by addressing Electro Products Laboratories, 349 West Randolph Street, Chicago 6, Illinois.

Dynamatic Corporation Acquired By Eaton Mfg. Co.

J. O. EATON, Chairman of the Board of the Eaton Manufacturing Company, has announced his company's acquisition of all outstanding shares of Dynamatic Corporation, Kenosha, Wisconsin. Established in 1933 Dynamatic Corporation is headed by Anthony Winther, who will remain in his present position, along with the rest o fthe company executives. Dynamatic manufacturing operations will continue in Kenosha.

Dynamatic Corporation manufactures numerous devices based on patented induction principles. Outstanding among its developments are the 18,000 horsepower drive for the Boeing wind tunnel in Seattle and the 7,000 horsepower drive for the Pratt and Whitney wind tunnel in East Hartford.

MANY OF THE WORLD'S FINEST DIESEL ENGINES ARE FACTORY-EQUIPPED WITH . . .

PIERCE GOVERNORS

★ For more than thirty years, Pierce engineers and field representatives have been meeting and solving difficult governing problems—and proving that *good* governing makes money for engine manufacturers and users alike.

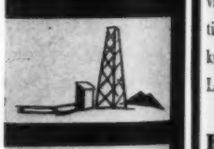
That is the reason that Pierce Governors *are* standard equipment on many of the world's finest diesel engines—and the reason they are specified by thousands of engine users in all kinds of applications.

Pierce Diesel Governors are available in two general types—and many adaptations. They drive directly from the fuel pump—or independently of the fuel pump shaft. Both types are unsurpassed for accuracy and unfailing dependability—and trouble-free long-life. They often outlast the engines themselves without repair or readjustment. Wherever governing is required, *good* governing is best—and that means Pierce!

PIERCE GOVERNORS

THE PIERCE GOVERNOR CO., INC. 1603 OHIO AVENUE ANDERSON, INDIANA

Manufacturers of Pierce Precision Governors and Sisson Automatic Chokes



Diesel Engines in Stationary Use

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disposal plants are on the drawing boards. Many already in existence are due for needed enlargement and modernization. Here the Diesel industry will find a tremendous market for its newly developed dual fuel engines. These engines will utilize the waste gases generated in the treatment plants to produce all power required for their operation.

Another application for the Diesel industry to explore is Communications. This growing field may well turn to Diesel power for its requirements in the remote locations where it is proving desirable to install facilities for the transmittal of television programs.

We are in the midst of a power age. New inventions and developments are steadily progressing that will need ever increasing volumes of cheap and reliable power which can be so well supplied with the Diesel.

The industry's export possibilities are beyond comprehension. Today a multitude of tasks are being performed in the unmechanized countries of the world by methods which we discarded generations ago. Many of these jobs can be done by Diesel power.

We foresee a very promising future for the stationary applications of the Diesel engine. It will be limited only by the limits of the vision of the industry and its ability to keep abreast of the times. Let's see that the developments of the Diesel engine keep pace with the opportunities for its use, and with the requirements of those markets where the inherent virtues of the Diesel make it the natural selection of a realistic power-consuming public. We know that we can and will build better Diesels. Let's also do a better job of selling them.

Brad Foote Issues Worm Hob List

A NEW bulletin containing the latest Standard Worm Hob list was recently issued by Brad Foote Gear Works. Designated as Section 9 of General Catalog No. 125, this 12-page bulletin lists some 700 different hobs with all necessary dimensions. The hobs themselves are not for sale but are in Brad Foote stock available for cutting gears from any practical material. The use of these hobs by designers and gear users will save much time when work is laid out to their dimensions. A copy of the Standard Worm Hob List will be mailed to anyone requesting same from Brad Foote Gear Works, 1309 South Cicero Avenue, Cicero 50, Illinois.

WE'VE LICKED POROSITY IN PRESSURE CASTINGS

K & W METHOD SHOWS TREMENDOUS SAVINGS

Thousands of dollars worth of castings — upon which thousands of dollars in machining labor have been expended — are being reclaimed daily through the K & W method by some of the industry's most important production foundries.

The K & W method has proved particularly successful on engine heads and blocks in the automotive industry where it has had the widest application.

Investigate

K & W METHOD OF RECLAIMING POROUS CASTINGS

1. It is fitted admirably into mechanized production techniques by K & W engineers.
2. It is applicable to all types of castings intended to retain liquids or air under pressure and is effective on practically all metals and alloys.
3. It costs little — an infinitesimal fraction of the cost of the casting itself.
4. It is demonstrated without obligation — in your plant upon your product — by K & W engineers.

KERKLING & COMPANY

Industrial Division: 334 North Ogden Avenue, Chicago 7, Illinois
Plants: Burbank, California; Bloomington, Indiana; and Chicago

New Roper Rotary Pumps

A ROTARY pump suited for Diesel fuel oil transfer work was recently announced by the George D. Roper Corporation. Supplied in ¾, 1½ and 3 gpm. sizes with pressures to 150 psi these pumps will handle total suction lifts up to 25 feet. Equipped with a built in relief valve and a mechanical oil seal these pumps are a compact job.

For further details write for Bulletin 10, George D. Roper Corporation, Rockford, Illinois.

Rankin Appointed Sales Manager C.P. Diesel Engines

THE appointment of Robert A. Rankin as Sales Manager of the Diesel Engine Division, Chicago Pneumatic Tool Company, was recently announced by G. J. Coffey, vice-president of sales at the company's general offices, in New York.

Mr. Rankin, formerly assistant manager of Engine Division, succeeds H. W. Buker, head of Diesel engine sales for last twenty years, the latter having retired to his farm in Maryland, after twenty-six years service with the company.

Graduating from Rensselaer Polytechnic Institute, Troy, N. Y. in 1928, Mr. Rankin joined the company as an engineering student the same year. In 1930, he became a general salesman in the Chicago District, later being transferred in 1933 to the Engine Division in charge of the Western territory.

In 1942, Mr. Rankin was promoted to assistant Sales Manager of Diesel Engine Division with headquarters in New York City. He is both a sales executive and technician. In the latter capacity he has supervised the installation of C. P. engines for war service in Greenland, Labrador, West Indies and South America.

"Check Diesel Bearings while the engine's running?—*SHOW ME!*"

We'd like to show you

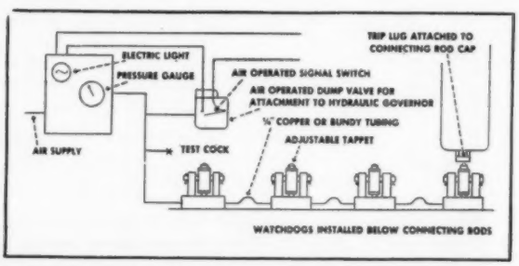
how you can detect wear beyond predetermined standard or shell-out of connecting rod and main bearings on your Diesels in plenty of time to prevent damage to the crankshaft.

"Inspecting" Diesel bearings without stopping the engine is accomplished by the Bearing Watchdog System, for the "Watchdog" trip levers installed in the crankcase (one below each connecting rod throw) literally "measure" bearing wear and detect shell-out of connecting rod and main bearings. When the wear reaches a certain point or shell-out occurs, the Bearing Watchdog System shuts down the engine almost instantly, preventing further damage.

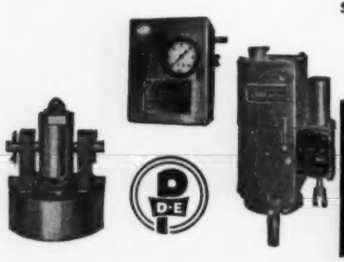
This amazing new maintenance cost-cutting device is simple, positive, and has a low maintenance factor. Operates either pneumatically or hydraulically.

One of the many leading railroads having installed the Bearing Watchdog System in its locomotives, recently reported savings of more than $75,000.00 in maintenance and repairs credited to the system. Let us SHOW YOU how you can cut your maintenance costs. Write today for complete details.

"Watchdog" trip lever installed below connecting rod throw.


TRIP LUG ATTACHED TO CONNECTING ROD CAP
ELECTRIC LIGHT
PRESSURE GAUGE
AIR OPERATED SIGNAL SWITCH
AIR OPERATED DUMP VALVE FOR ATTACHMENT TO HYDRAULIC GOVERNOR
½" COPPER OR BUNDY TUBING
AIR SUPPLY
TEST COCK
ADJUSTABLE TAPPET
WATCHDOGS INSTALLED BELOW CONNECTING RODS

SCHEMATIC DIAGRAM OF BEARING WATCHDOG SYSTEM . . .
Crankshaft Protector



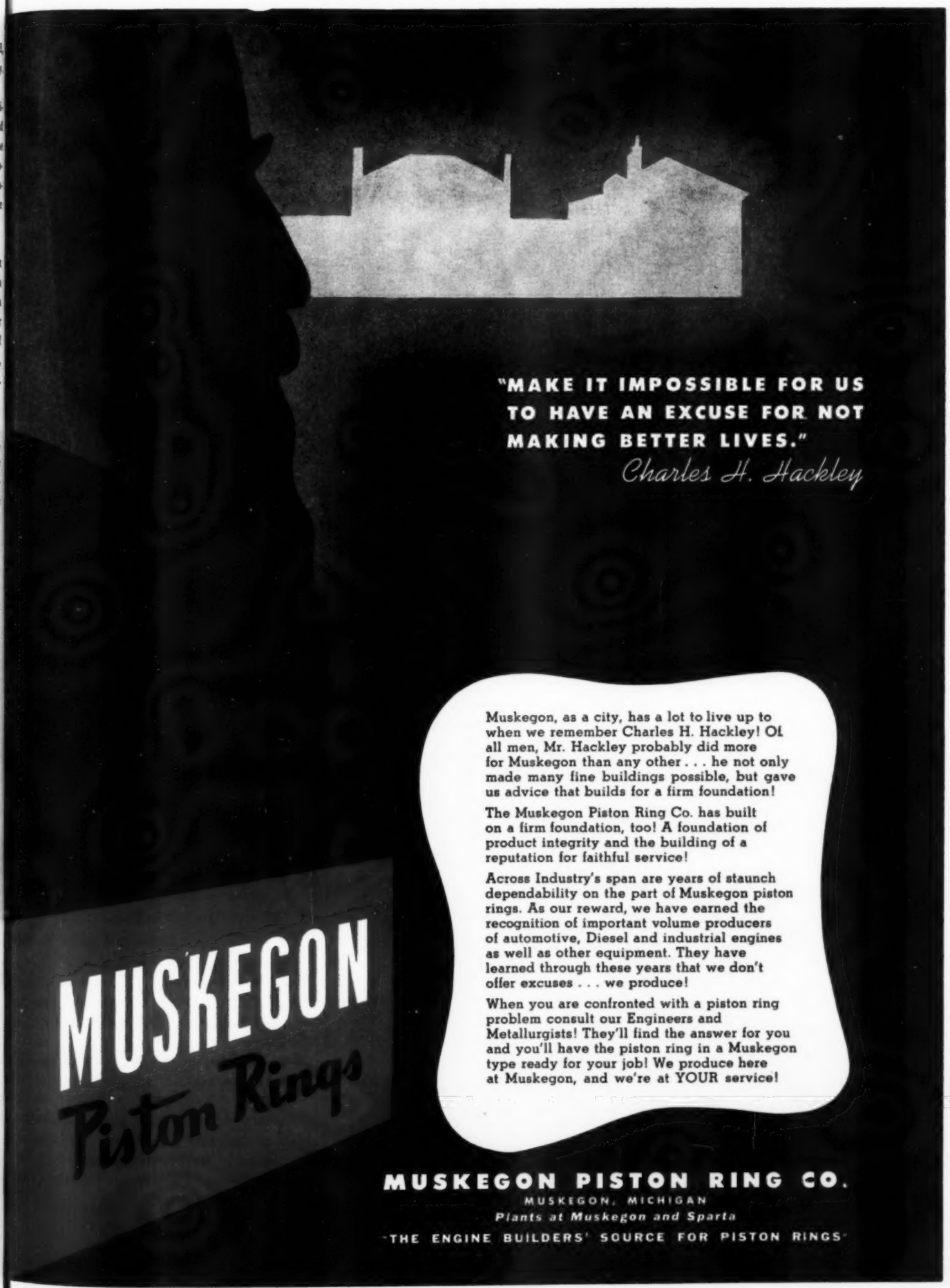
BEARING WATCHDOG SYSTEM
PAXTON DIESEL ENGINEERING COMPANY
OMAHA 5, NEBRASKA
Diesel Specialties • Parts • Repair Service
A subsidiary of PAXTON-MITCHELL COMPANY
Engineers - Founders - Craftsmen

Enterprise Appoints Everett

APPOINTMENT of W. S. "Bill" Everett, former Lieutenant Commander in the Office of Inspector of Naval Materiel, as Sales Engineer is announced by Enterprise Engine & Foundry Company.

W. S. Everett

A graduate in physics from California Institute of Technology, Everett also holds a master's degree in mechanical engineering and is active in the American Society of Mechanical Engineers, Society of Automotive Engineers and American Statistical Society. His background includes several years of machine design, petroleum plant installation and general plant engineering, with Standard Oil Company of California and Colgate-Palmolive-Peet Company. Everett's experience is expected to prove valuable in oil field and stationary Diesel applications in the Southwestern territories to be opened shortly by Enterprise.


"MAKE IT IMPOSSIBLE FOR US TO HAVE AN EXCUSE FOR NOT MAKING BETTER LIVES."
Charles H. Hackley
Muskegon, as a city, has a lot to live up to when we remember Charles H. Hackley! Of all men, Mr. Hackley probably did more for Muskegon than any other . . . he not only made many fine buildings possible, but gave us advice that builds for a firm foundation!
The Muskegon Piston Ring Co. has built on a firm foundation, too! A foundation of product integrity and the building of a reputation for faithful service!
Across Industry's span are years of staunch dependability on the part of Muskegon piston rings. As our reward, we have earned the recognition of important volume producers of automotive, Diesel and industrial engines as well as other equipment. They have learned through these years that we don't offer excuses . . . we produce!
When you are confronted with a piston ring problem consult our Engineers and Metallurgists! They'll find the answer for you and you'll have the piston ring in a Muskegon type ready for your job! We produce here at Muskegon, and we're at YOUR service!
MUSKEGON
Piston Rings
MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
Plants at Muskegon and Sparta
"THE ENGINE BUILDERS' SOURCE FOR PISTON RINGS"

Aluminum Company of America Plans Expansion

THOMAS D. Jolly, vice president and chief engineer of Aluminum Company of America, recently announced the company's plans for the construction of a large new plant near Davenport, Iowa, for the rolling of aluminum sheet and plate. The plant, which is to cost more than $30,000,000, will have the capacity to produce more than ten million pounds of sheet and plate per month when placed in operation. Construction is scheduled to begin as soon as the project has been approved by the Civilian Production Administration, and completion of the plant will require approximately 18 months.

The plant buildings will enclose 43 acres of floor space under roof, he stated, and equipment to be installed in them will be able to process the largest aluminum ingots manufactured.

An outstanding feature of the new plant will be its huge, high-speed continuous "hot mills" and "cold mills" capable of rolling sheet up to 120 inches in width. This equipment will produce aluminum sheet and plate in all forms to supply the great post-war demand.

Baldwin Locomotive Names Eastern Sales Manager

IN line with the Baldwin Locomotive Works plan for sales expansion, Roland C. Disney has been appointed manager of the Eastern District of the Baldwin Locomotive Works, it was announced recently by Robert G. Allen, General Sales Manager. Mr. Disney, who recently was relieved from Army duty with the rank of lieutenant colonel, will have his offices in Philadelphia.

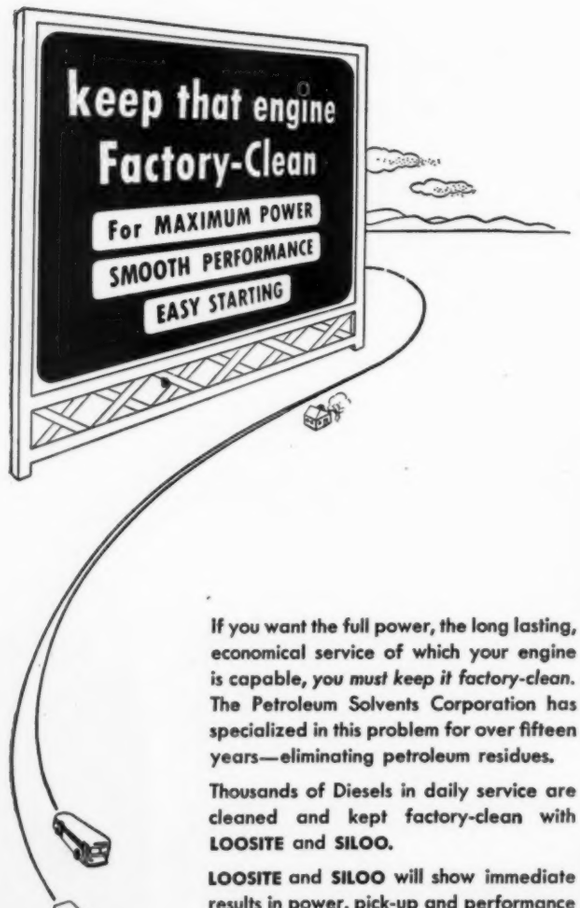
Roland C. Disney

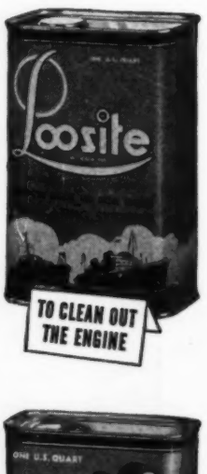
Mr. Disney graduated from Baltimore Polytechnic and attended Johns Hopkins University. He had been in the engineering department of the Western Electric Company for eleven years before he was called to active duty early in 1941. Assigned to the Philadelphia Ordnance District, Lieut. Col. Disney served as chief of the Tank and Automotive Division and assistant chief of the Industrial Division. Later he served in the European theater with the Ordnance Industrial Division.

Tube Turns Inc. Promotes S. M. Spears

S. M. SPEARS, JR. has been promoted to assistant district manager of the New York office of Tube Turns, Inc., Louisville, Ky., it is announced by Jack Green, sales manager of the firm's welding fittings division.

A native of Memphis, Tenn., Spears attended Louisville Male High School and Oklahoma University. He joined Tube Turns, Inc., in May, 1936 and was assigned to the New York office in January, 1937.





If you want the full power, the long lasting, economical service of which your engine is capable, *you must keep it factory-clean.* The Petroleum Solvents Corporation has specialized in this problem for over fifteen years—eliminating petroleum residues.

Thousands of Diesels in daily service are cleaned and kept factory-clean with **LOOSITE** and **SILOO.**

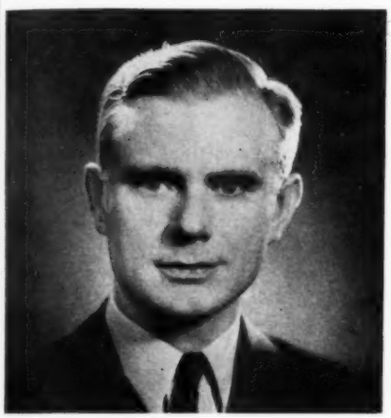
LOOSITE and **SILOO** will show immediate results in power, pick-up and performance on any make Diesel or gas engine regardless of type or brand of oil used. The treatment is simple, safe and inexpensive. See your supplier today or write to

SOLVENTS FOR ALL TYPES OF PETROLEUM RESIDUES
Petroleum Solvents
CORPORATION
General Offices: 331 Madison Avenue, New York 17, N. Y.
Plant and Laboratories: Port Reading, New Jersey
Petroleum Solvents Corp. of Canada, Ltd.
Dominion Square Bldg., Montreal

If you heat with oil — write for information on
SILOO FUEL OIL TANK SOLVENT

E. J. vanDyk Joins General Motors Sales Force

E. J. VANDYK will bring a well-rounded engineering knowledge of all phases of oil drilling to bear upon his new job as Petroleum Industry Field Engineer and District Manager of Sales for the Detroit Diesel Engine Division of the General Motors Corporation. vanDyk's appointment, announced by V. C. Genn, General Sales Manager of the Detroit Diesel Engine Division, is to the district which includes Oklahoma, Kansas and Illinois.



E. J. vanDyk

vanDyk is a mechanical engineering graduate of Wayne University, Detroit, Michigan, Class of 1936. His first employment was with the Surface Combustion Company of Toledo, Ohio, a subsidiary of Cities Service. He served as an engineer with the Detroit City Gas Company before joining General Motors in 1939. With the Detroit Diesel Engine Division, his work has been to head up study of various phases of the application of the GM Series 71 Diesel engine to oil well drilling and oil pumping operations. Mr. vanDyk will be located at Tulsa, Oklahoma and will work out of the General Motors Petroleum Industry Sales Office in the Philtower Building.

Diesel Ship *Stavelot*

BUILT in Belgium, the Diesel ship *Stavelot* recently arrived at New York on her maiden voyage inaugurating a direct freight and passenger service between Antwerp and New York.

This 546 ft. 12,000 dwt. vessel is engined with 5 Sulzer Diesels developing 12,000 hp. for a speed of 18½ knots. The engines are 2 cycle, 6 cylinder, double acting type, with dual injectors in the lower combustion chamber and one injector in the upper. Auxiliary power is supplied by two 200 kw., 5 cylinder, 4 cycle Sulzer Diesels.

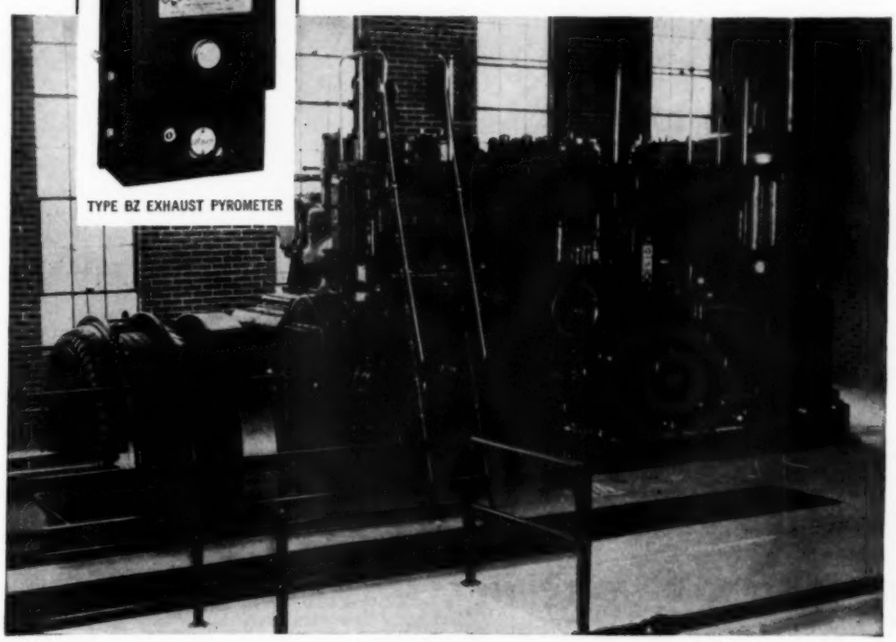
Another municipal plant

uses *Alnor* **EXHAUST PYROMETERS**

This Fairbanks-Morse Diesel generator set is one of several serving a prosperous midwest town. As is so frequent in well equipped and well managed power plants, you will find Alnor Exhaust Pyrometers on the instrument board. These reliable pyrometers allow an easy check of exhaust temperatures for maintaining smooth, efficient engine operation. There is an Alnor Pyrometer of the right size for any engine, large or small. Write for bulletin with complete description.

TYPE BZ EXHAUST PYROMETER

ILLINOIS TESTING LABORATORIES, INC.
420 N. LA SALLE STREET • CHICAGO 10, ILLINOIS



Oil Refiner for Marine Engines

AN oil refiner which is capable of restoring used lubricating oil to the quality of new oil is announced by the Youngstown Miller Company, a subsidiary of Walter Kidde & Company, Inc. A model designed especially to serve marine Diesel engines is now in production. It is said to remove not only solid suspended impurities but dissolved contaminants, acids, and fuel dilution as well. It is also claimed to impart remarkable anti-varnish and anti-ring-sticking qualities to the oil.

RE-REFINING

According to the manufacturer, the common methods of "reclaiming" used lubricating oil in recent years have been based principally upon the removal of solid suspended impurities.

The refiner is said to remove both the solid and the dissolved impurities.

In this process, the dirty oil is pumped to a heating chamber under automatic float control and adsorbent earth is added in suitable proportion. The two are then thoroughly mixed by means of an agitator and are heated by electricity. Heating and mixing are of sufficient duration to fully utilize the adsorbent material and to drive off volatile contaminants.

The oil and earth mixture is next dropped into a transfer tank from which it is forced into a two stage filter press by air pressure.

Additional information about the refiner may be obtained from the Youngstown Miller Company, 675 Main Street, Belleville 9, New Jersey.

ONLY ONE WAY TO *Correctly* Tension A STUD OR BOLT

Snap-on

TORQOMETERS

insure accuracy — tell tension as bolt is tightened...

He *sees* the applied torque as the bolt is tightened . . . as easily as reading a watch.

Throughout industry, Snap-on Torqometers are being adopted as standard wrench equipment for precision assembly and maintenance operations. Available in a complete range of sizes from zero to 30 in. lbs., up to 2,000 ft. lbs. Torqometers are part of the complete line of more than 3,000 Snap-on tools, available everywhere through Snap-ons nation-wide direct-to-user tool service.

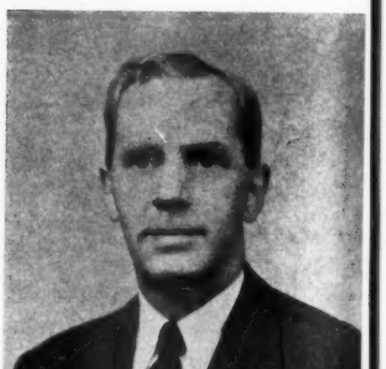
WHERE specifications call for accurate, *uniform* stud or bolt tension, Torqometers should *always be used.* "Guesswork" tightening is an open invitation to all the troubles that follow mechanical distortion . . . wasted power, dangerous wear, breakage of parts. Even highly skilled mechanics cannot be expected to approximate specified pressures.

With Snap-on Torqometers any worker can tighten bolts to the exact foot-pound of tension *every time* . . . and on delicate mechanisms, to the *exact inch pound.*

SNAP-ON TOOLS CORPORATION
8106-G 28th AVENUE KENOSHA, WISCONSIN

B. Gordon Valentine Appointed Chief Engineer of Sterling Engine Company

B. GORDON VALENTINE, well-known designer of gasoline and Diesel engines, has been appointed Chief Engineer of the Sterling Engine Company of Buffalo, N. Y., it was recently announced by Addison F. Vars, President. The appointment of Valentine to this key position is in keeping with a long-established policy of Sterling of devoting the finest talent and latest equipment available to production, research and development.



B. Gordon Valentine

A veteran of World War I where he served nearly five years with the British Army, Valentine received his early technical training at St. Andrews University in Scotland, where he graduated in 1921. His professional career has been devoted entirely to the design and application of internal combustion engines – particularly Diesel engines–for stationary, marine, locomotive and tractor installation. Prior to joining the Sterling Engine Company in September of last year, Valentine had been employed by Wm. Beardmore & Company, Scotland, Bethlehem Shipbuilding Corporation, Ingersoll-Rand Company, Cooper-Bessemer Corporation and John Deere Tractor Company.

Caterpillar Names Sales Development Manager

CORNELL E. JONES, formerly a major in the Army Corps of Engineers, has been named Sales Development Manager of the Caterpillar Tractor Co., according to an announcement by H. H. Howard, General Sales Manager of the company.

Cornell E. Jones

Mr. Jones is well known in the heavy machinery and contractors' industry, having served with county and state highway departments, the J. D. Adams Co., and International Harvester Co. both in domestic and foreign operations. During the war, Mr. Jones was assigned to the Peoria, Illinois, industrial area, charged with procuring "Caterpillar" Products for the Corps of Engineers. Mr. Jones takes over the duties of Kenneth F. Park, recently named to the newly created post of engineering consultant on all matters pertaining to the earthmoving field.

Marion's New Name

ANNOUNCEMENT is made by M. E. Montrose, President, of the change in name from the Marion Steam Shovel Company to Marion Power Shovel Company after stockholder approval at the annual meeting held in Marion, Ohio, recently.

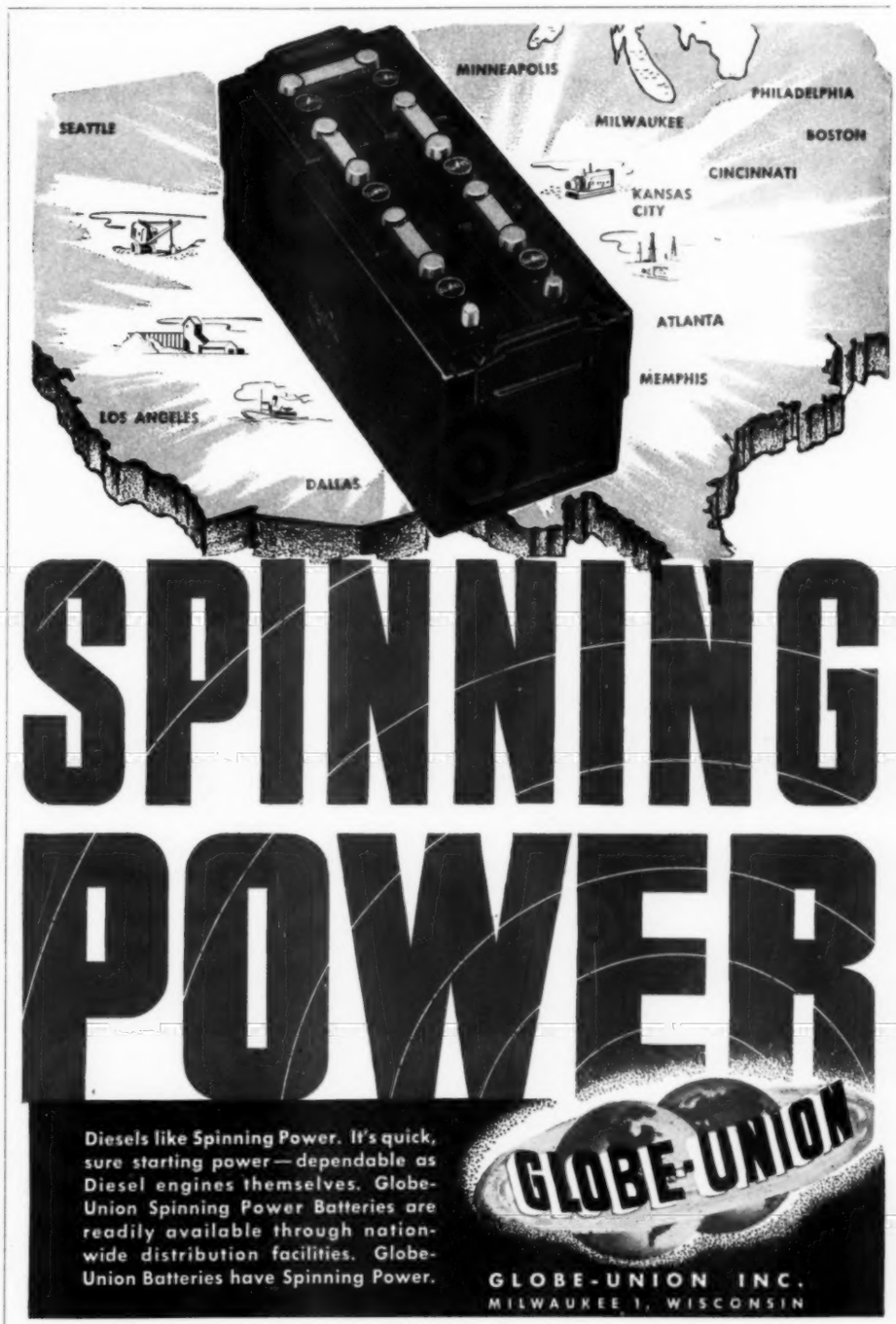
This change in name, the first one since the company was founded more than 60 years ago, was desirable because the larger portion of production during the past 15 years has been Diesel, gasoline and electric driven machines and the new name more truly identifies the company with its products.

In the mid-twenties there were nearly as many Marion electric, gasoline and Diesel powered machines produced as steam machines. The percentage of production of these types increased rapidly to the final exclusion of steam.

Marion Power Shovel Company is now in the midst of an extensive modernization and rehabilitation program involving the purchase of new machine tools and equipment. The factory phase of this program is under the direction of John M. Demarest, recently elected Vice President and Works Manager, who has broad experience in all phases of planning and administration related to increased efficiency in manufacturing and production.

1945 Diesel Progress Editorial Index Available

A COMPLETE Editorial Index of all issues of DIESEL PROGRESS published in 1945, including an Authors Index as well, has been made up in a 10-page, 8½" x 11" folder and is now available for distribution. A copy of the Index will be mailed, without charge, to all individuals requesting it on their letterhead. Address your request for the 1945 DIESEL PROGRESS Editorial Index to DIESEL PROGRESS, 2 West 45th Street, New York 19.



To help increase "Take-Home Savings"

THE Treasury Department has published two new booklets to help you and your employees realize the utmost benefit from your Payroll Savings Plan—benefits proportioned to the extent your employees add to "take home savings" by buying and holding U. S. Savings Bonds.

"Peacetime Payroll Savings Plan" for key executives offers helpful suggestions on the conduct of the Payroll Savings Plan. In addition, it quotes leaders of Industry and Labor and their reasons for supporting the Plan.

"This Time It's For You" is for distribution to employees. It explains graphically how this convenient, easy thrift habit works. It suggest goals to save for and how much to set aside regularly in order to attain their objectives. If you have not received these two booklets, or desire additional quantities, communicate with your State Director of the Treasury Department's Savings Bond Division.

See your Payroll Savings Plan through to maintain your share in America's future. It is sound economics and a powerful force for good today—and tomorrow—as a safeguard for stability and a reserve of future purchasing power—money that is kept within your community.

The Treasury Department acknowledges with appreciation the publication of this message by

R. F. Gaddard

Editor—DIESEL PROGRESS

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and Advertising Council

Brazilian Officials Visit Sperry Plant

Walter S. Fish of the Sperry Export Sales Department explains the operation and test of the Sperry Gyro-Compass on the high angle Scorsby to Commodore E. E. Brady Jr., U.S.N., Technical Advisor and Liaison Officer to Lloyd Brasileiro; Captain H. V. Boisson, Port Captain; R. E. Zumsteg, agent of Lloyd Brasileiro in New York; and W. R. Hight, Sperry Marine Works Engineer.

The visit to Sperry was conducted to inspect equipment being prepared by Sperry Gyroscope Company for the Lloyd Brasileiro school ship "Santos."

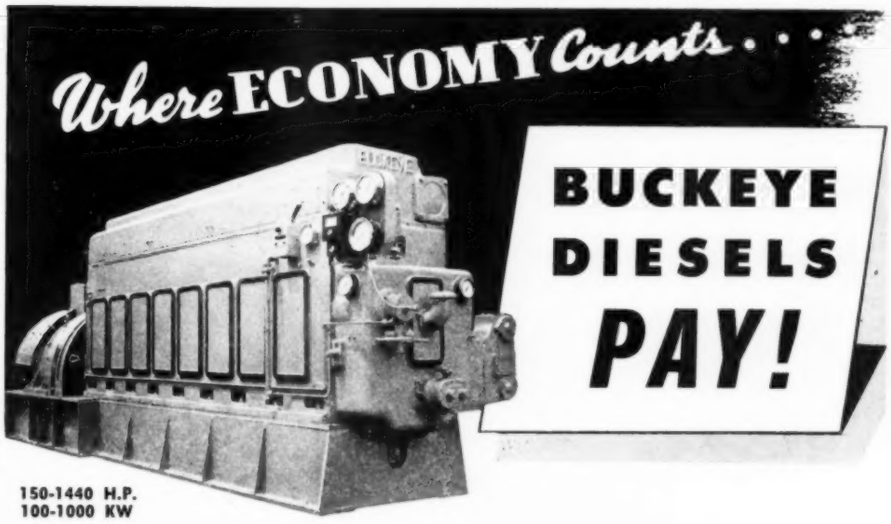
The "Santos" is being equipped with the most modern apparatus for the training of future Merchant Marine Officers who will operate the ultra-modern Lloyd Brasileiro ships now under construction in this country and Canada.

Complete Line of Switchboard Tachometers

THE Metron Instrument Company has just put on the market a complete line of electric switchboard tachometers working on an entirely new principle. These tachometers are not of the generator type. The head consists merely of a very simple contact-making mechanism which is connected to the indicating unit by an electric cable. This cable may be any length up to 1000 feet. These oscillating contacts periodically charge a condenser through a DC milliammeter. The circuit constants are chosen so that the milliammeter does not correspond to each charge but reads the average current. The circuit was designed so that the current is exactly proportional to the rpm. of the spindle which operates the contacts. Operation is from the 115 volt AC power line. No vacuum tubes or warm-up are required.

Pictorial Drafting Made Easy

THE principles of pictorial engineering drafting, as utilized in isometric and dimetric projection, are explained clearly and concisely in a 20-page illustrated booklet written by Paul F. Boehm. In addition to illustrating and explaining the fundamentals of isometric and dimetric drawings, this new treatise also gives complete details of the new "Instrumaster" Stencils which have been especially developed to make the construction of isometric and dimetric drawings not only faster and easier than possible with conventional methods but more accurate as well. The booklet is available without charge through the John R. Cassell Co., Inc., 110 West 42nd St., New York 18, N. Y.



BUCKEYE POWER = EXTRA PROFITS

Today's narrowed profit margins make low cost power more important than ever before as a logical source of extra profits. Ever since 1908 — in thousands of stationary and marine installations — owners and operators have learned that the name "Buckeye" on an engine means ECONOMICAL POWER.

Buckeye owners will tell you that their savings in power cost represent a worthwhile profit that was formerly labeled "Operating Expense."

BUCKEYE ECONOMY and DEPENDABILITY

Every feature of Buckeye design and construction has been developed to bring the highest standards of dependability and economy to users of Diesel power. For example, Buckeye valve areas are larger because there are no valve cages. This increases combustion efficiency by providing faster air flow and quicker expulsion of gases. Crankshaft and connecting rod bearings are reversible, shell-type, silver alloy — made by an exclusive Buckeye process — and will last, with proper care, for the life of the engine. These and many other features are responsible for the low cost, dependable operation of Buckeye Diesels.

Buckeye engines are appreciated most where the going is tough . . . the service twenty-four hours a day . . . and a low cost source of dependable power is required.

Our engineering staff is always at your service. No obligation—no cost. Just write.

MARINE

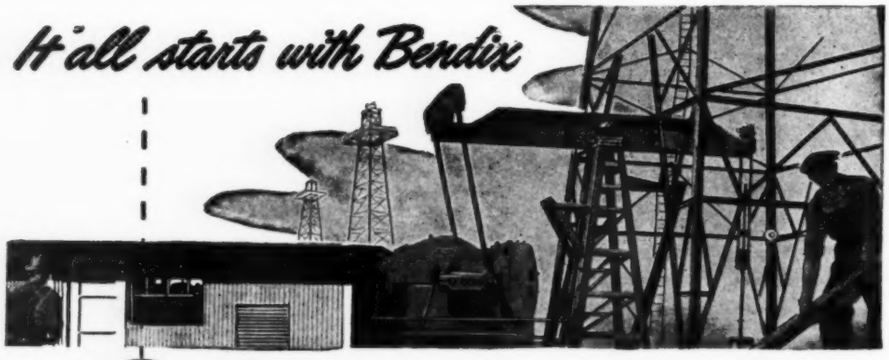
STATIONARY

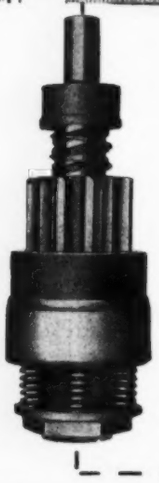
"Be Profit-Wise and Dieselize with Buckeyes"

THE BUCKEYE MACHINE CO.
LIMA . . . . . OHIO

Engine Builders Since 1908

It all starts with Bendix





The Drive for Heavy-Duty Starting

Heavy-duty industrial machinery demands quick, dependable starting—and Bendix Heavy-Duty Starter Drives provide just that.

Specifically designed for the task at hand—engineered to operate satisfactorily even under adverse working and weather conditions—Bendix Heavy-Duty Starter Drives are performance-proven in starting all types of industrial machinery.

In the forests—on the farms—in the oil fields and in the factories—in fact, wherever heavy-duty starting demands *the best*—it's Bendix! Over sixty-five million installations of Bendix Starter Drives to date—many more *tomorrow*. Better buy Bendix!

*REG. U. S. PAT. OFF.

Bendix Drive

PRODUCT OF Bendix AVIATION CORPORATION

ECLIPSE MACHINE DIVISION • ELMIRA, NEW YORK

DIVISION OF BENDIX AVIATION CORPORATION

MISOL

THE MILLER DIESEL FUEL ADDITIVE

THIS STARTLING NEW DISCOVERY GIVES YOU CLEAN FUEL SYSTEMS AND PEAK EFFICIENCY FROM TANK TO COMBUSTION CHAMBER.

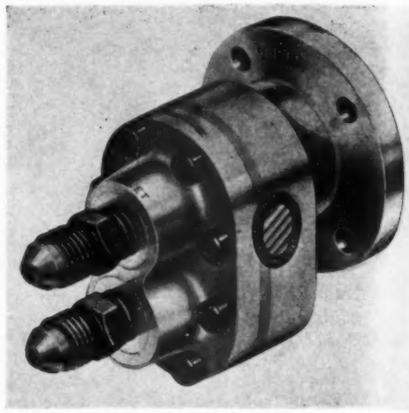
SAFE AND ECONOMICAL

Descriptive Literature and full information on request

MILLER MANUFACTURING CO.

1100-1110 NORTH 32ND STREET CAMDEN, N. J.

Pressure Lubrication Pump



New McIntyre Lubrication Pump

THE Series 1200 Pump is designed for pressure lubrication of bearings of machine tools, Diesel engines, turbines, generators and other hi-speed and heavy machinery, and fluid handling in aircraft at high altitudes. This Direct-Drive Gear Pump is a small light weight (8 oz.) unit operating with a volumetric efficiency of 95%. Three standard models displace from .00 gallons per minute to 1.5 gallons per minute at speeds ranging from 1140 rpm. to 3450 rpm. against pressures up to 150 pounds per square inch.

Standard models are designed for direct motor application, but pumps can be furnished for flange mounting, belt, spline and other drives. Power requirements vary between 1/100 hp. to 1/6 hp. The pump body is constructed of aluminum, with nitrided nitralloy spur gears and shafts.

Further information concerning this product can be obtained from The McIntyre Co., 15 Riverdale Avenue, Newton 58, Mass.

New Fire Extinguishing System for Buses

THE role of carbon dioxide in controlling flammable liquid and electrical fires is a familiar story to most engineers. It has been less well known to those concerned with automotive transportation. But modern developments in fire control, in the form of built-in carbon dioxide fire-extinguishing systems, are now being extended to the transportation field. A newly designed fire-detecting and extinguishing system for engine compartments is now in process of installation in several fleets of intercity buses.

The essential component parts in this new fire-extinguishing system for buses comprise fire detectors, strategically located throughout

he fire zone; an indicator panel, mounted near he driver, and containing a red signal light o warn the operator of the first flash of fire; manual control pull-handle installed near the perator; and the control head, flood valve nd cylinder of compressed carbon dioxide.

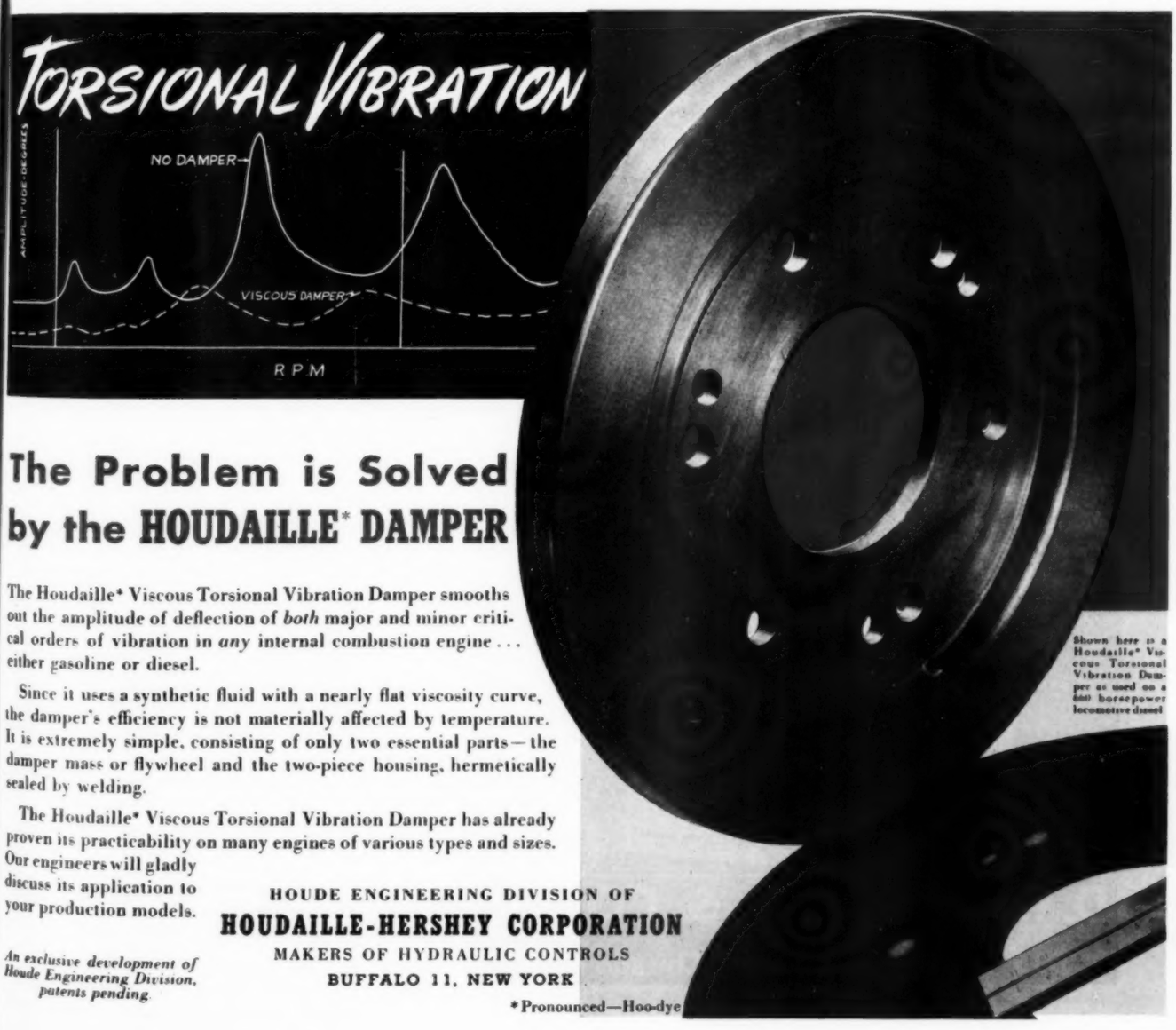
The problem of detecting fire in a bus engine s of equal importance with that of extinguishing it, for reasons already touched upon, and in the Kidde bus system it is handled in a manner similar to that which was developed for their tank fire-extinguishing system. Special flame detectors are therefore employed which will function efficiently under the most trying conditions. Smaller than a man's thumb, these detectors contain two organic filaments which withstand all ordinary heat, but disintegrate instantly upon contact with flame, closing a warning circuit which flashes a red fire signal in an indicator panel on the dashboard. At the pull of a lever the highly-compressed carbon dioxide changes into gas the moment it emerges from the discharge nozzles, expanding 450 times and thus penetrating into every cranny of the engine space.

Lubrication of Construction Machinery

THE February issue of Lubrication, a Texas Company publication, is devoted entirely to a treatise on the lubrication of heavy earth-moving and construction machinery, including tractors, shovels and various earth-moving tractor attachments. The equipment and procedure, also, lubricant specifications are completely tabulated and illustrated in this issue which carries a total of 20 pages. This material should prove very helpful to all concerned with the problem of properly maintaining heavy-duty construction machinery. Write for your copy of Lubrication to The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Motor Boat Show

As we close for press comes the news that there *will* be a Motor Boat Show in 1947. Dates will be announced shortly by the National Engine & Boat Association, probably the second week in January at the Grand Central Palace. It is suggested that those of our readers planning to exhibit at this Motor Boat Show get in touch immediately with Ira S. Hand, Secretary of the Association in the Graybar Building, New York.



Shown here is a Houdaille* Viscous Torsional Vibration Damper as used on a 600 horsepower locomotive diesel

The Problem is Solved by the HOUDAILLE* DAMPER

The Houdaille* Viscous Torsional Vibration Damper smooths out the amplitude of deflection of *both* major and minor critical orders of vibration in *any* internal combustion engine . . . either gasoline or diesel.

Since it uses a synthetic fluid with a nearly flat viscosity curve, the damper's efficiency is not materially affected by temperature. It is extremely simple, consisting of only two essential parts—the damper mass or flywheel and the two-piece housing, hermetically sealed by welding.

The Houdaille* Viscous Torsional Vibration Damper has already proven its practicability on many engines of various types and sizes. Our engineers will gladly discuss its application to your production models.

An exclusive development of Houde Engineering Division, patents pending.

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MAKERS OF HYDRAULIC CONTROLS
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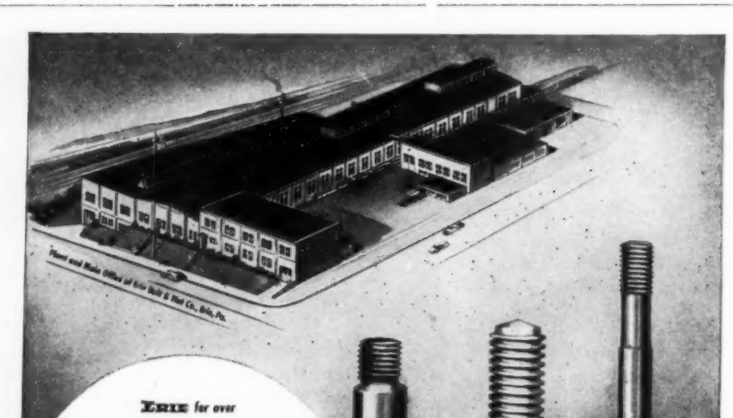
*Pronounced—Hoo-dye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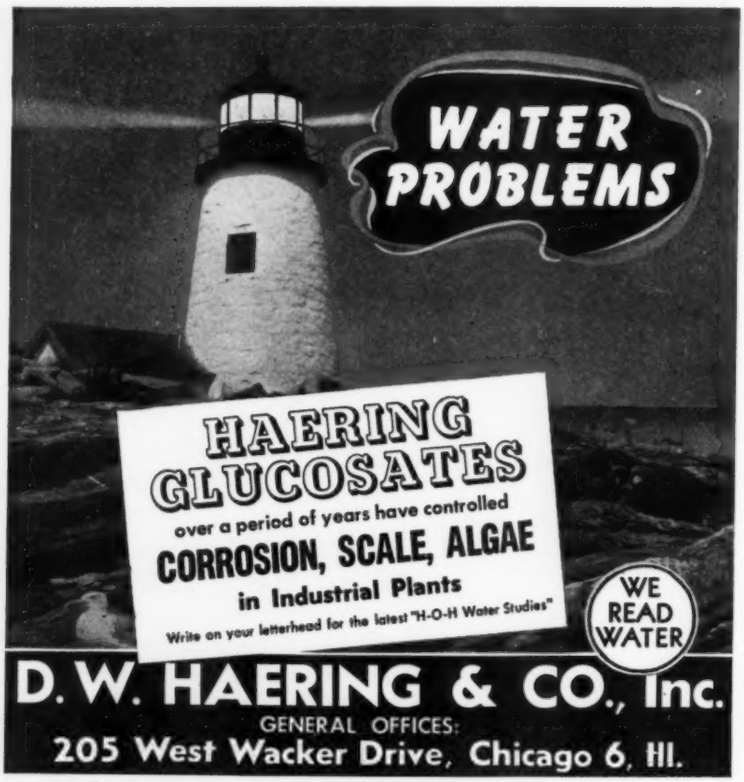
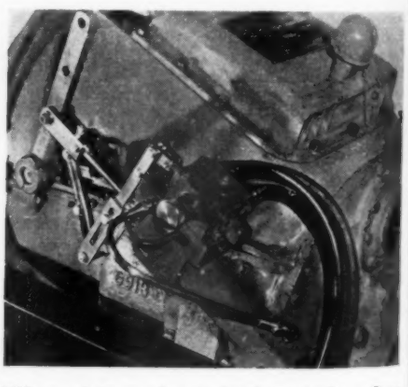


New, Continuous Reading Viscosimeter

A NEW kind of continuous Viscosimeter is described by the Fischer & Porter Company in a technical bulletin recently released. The operational characteristics represent a radical departure from the conventional method of viscosity measurement. The instrument is so constructed as to permit instantaneous observation of viscosity values existing in a moving fluid stream under full line pressure. This Viscosimeter is available in simple indicating form, or arranged for continuously recording viscosity values on a 24 hour chart or for controlling fluid viscosity by automatic blending or heating means. The instrument is said to be particularly valuable for continuously blending lube oils. Readers may obtain a copy of this bulletin by writing to Fischer & Porter Company, Department 5E-2, Hatboro, Pennsylvania.

New Hydraulic Clutch Control By Ellinwood Industries

ELLINWOOD Industries has added to its Marine Line, a Power Boost Clutch Control. This new control, designated as Model "D," allows commercial and pleasure craft owners to shift clutch or reverse gears with a simple, reliable hydraulic control which will handle with ease and efficiency any engine which previously had been operated by manual, mechanical, vacuum or electrical power.



Ellinwood power boost clutch control on Gray Marine Diesel with Twin Disc Clutch.

The heart of the system is the power cylinder which is designed to couple directly and simply to the reverse gear shifting lever and is capable of exerting a thrust of 1000 pounds through a six inch stroke. The movement of the clutch lever is as slow or rapid, smooth or jumpy, as the man or woman who handles the Master Control wishes to make it. The system elimi-

nates any uncontrolled power, being so designed that every movement of the Master is immediately and precisely duplicated by the power cylinder.

Drawing upon their war and peacetime experience with critical aircraft and Marine remote controls, Ellinwood engineers have designed this simple, easy to install and maintain, reliable Model "D" remote control which is capable of filling a need in Marine and industrial power installations. For full particulars write Ellenwood Industries, 160 West Slauson Avenue, Los Angeles 3, Cal.

New Explosion-Proof Pressure Operated Switch Permits Adjustments Without Exposing Electrical Circuit

METRON Corporation announced recently development and manufacture of new pressure operated switch suitable for atmospheres containing vapors of ethyl ether, gasoline, alcohol, acetone, petroleum, naphtha, lacquer solvents, as well as natural gas and grain dust; these cover Underwriters' Laboratories listings Class I Groups C & D, Class II Group G.

The unit incorporates an explosion-proof Underwriters' Listed Micro switch. Separate housings for pressure and electrical controls make possible adjustments in the pressure system without disconnecting or exposing the electrical circuit.

Various models of the new switch provide uniform pressure control from 25 to 2500 psi. Weight of the entire unit, including mounting bracket, is 3¾ pounds.

Additional details, including operating specifications may be obtained from the manufacturer, Meletron Corporation, 950 North Highland Avenue, Los Angeles 38, California.

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SHEPPARD DIESEL Auxiliary Unit equipped with an air cooled Quincy Compressor.

COMPACTNESS and DEPENDABILITY are prime factors in the choice of air compressors for auxiliary service. Quincy offers a line of advanced design air compressors that are easily installed as an integral part of Diesel equipment. They can be relied upon for *dependable* air supply over a long, trouble-free service life. Sizes available from 1 to 80 cu. ft. displacement. Pressures up to 500 lbs. p.s.i. A Quincy compressed air specialist is ready to serve you. Ask him about your air problems.

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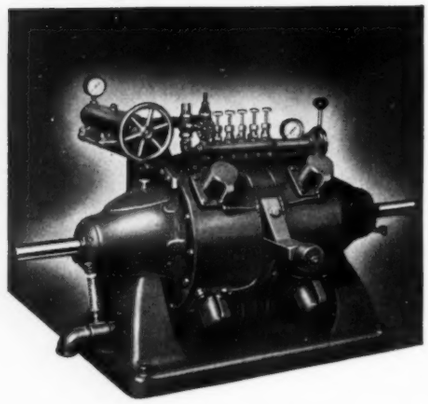

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High-torque testing at speeds right down to zero R.P.M.! That is what you can do with the combination of hydraulic dynamometer and Prony brake — an exclusive *HI-EFF* feature. In addition to the standard hydraulic rotors for high and medium-speed testing, low-speed brake drums are an integral part of the dynamometer . . . both cooled by the same circulating water. This unique arrangement results in an exceptionally wide range of speed and B.H.P. capacity in one machine —greatly broadens the possible testing range. The hydraulic rotors may be operated alone, the Prony brake operated alone, or both rotors and brake operated in combination.
If you are faced with a low-speed, high-torque testing problem, or if you are in need of a dynamometer with the widest range of testing capacities, let us give you details of *HI-EFF* applications — probably some similar to your requirements. Taylor Manufacturing Co., 3082 W. Meinecke Ave., Milwaukee 10, Wis.

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MANUFACTURERS OF "HI-EFF" HYDRAULIC DYNAMOMETERS — STATIC BALANCING MACHINES — SENSITIVE DRILLING MACHINES

New Production Method Saves Porous Castings

COSTLY failures in cast parts due to existent porosity, or pin hole cracks, is now being largely eliminated in many foundries and industrial plants through use of the K&W Method of reclaiming porous castings according to reports of the Industrial division of Kerkling & Company. The saving value of this K&W method is apparent when it is remembered that in most instances porosity is not discovered until after costly time and machine work has been expended.

As an example of the effectiveness of this method, Kerkling & Company relates the experience of one leading manufacturer of truck engines saving more than five hundred machined engine castings, in only a few weeks, at negligible cost. The K&W Method is said to be effective on practically all metals and alloys, and is applicable to mass production techniques to provide added protection for normal castings as well as for the recovering of occasional faulty castings. Kerkling & Company engineers assist in devising and installing the equipment that will serve to best advantage.

Further information may be had upon request from Kerkling & Company, Industrial Division, 334 N. Ogden Ave., Chicago, Illinois.

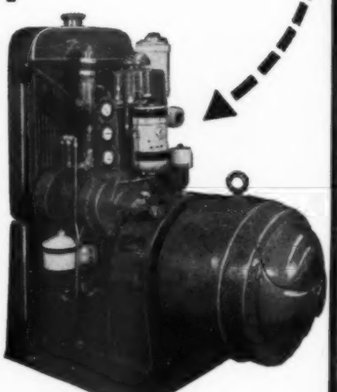
Twin Disc House Organ Features Hydraulic Drives in New Issue

THE answers to many important questions concerning hydraulic drives in a wide variety of industrial applications are contained in the latest issue of *Production Road,* house organ of the Twin Disc Clutch Company, Racine, Wisconsin.

Roger G. DeLong

The publication was prepared under the supervision of Roger G. DeLong, newly-appointed

Nothing Extra to Buy



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Write for new 12 page booklet showing standard equipment and other features of Sheppard Diesel Engines and Generating Sets.

R. H. SHEPPARD COMPANY, INC.
16 Middle St., Hanover, Pa.

DIESEL'S THE POWER—Sheppard's

ales manager of the company's Hydraulic Division at Rockford, Illinois, where Twin Disc Hydraulic Torque Converters (Lysholm-Smith type) and Hydraulic Couplings are designed and built.

Questions regarding selection of the best type of hydraulic drive for a particular type of application are answered under the heading of "Converter or Coupling?" a non-technical article of importance to the manufacturers and users of all types of powered industrial equipment and machinery. The construction, operation and application of both types of hydraulic drives are fully and simply discussed in this article. In addition, the publication illustrates with photographs and field data the advantages of each type of drive in various fields of application.

Copies of the hydraulics issue of *Production Road* are available on request. Write the Twin Disc Clutch Company, Hydraulic Division, Rockford, Illinois.

New Booklet On Off-track Maintenance Equipment

THE contributions made by the use of off-track equipment to the advancement of the continued flow of revenue traffic on the railroads of the nation are featured in *Railroading*, a 12-page booklet published by Caterpillar Tractor Co. The booklet stresses the gradual reduction in the use of the expensive and time-costing work trains as off-track equipment assumes greater responsibility in the maintenance of right-of-way. The equipment cleans and maintains ditches, widens banks, removes debris from slides and backfills wash-outs and, because of its capacity for work and versatility, is speeding up improvement work—eliminating tunnels, reducing curves and improving visibility—at lower costs than ever before experienced. The booklet is available by writing Caterpillar Tractor Co., Peoria 8, Illinois, requesting Form 9320.

1945 Diesel Progress Editorial Index Available

A COMPLETE Editorial Index of all issues of DIESEL PROGRESS published in 1945, including an Authors Index as well, has been made up in a 10-page, 8½" x 11" folder and is now available for distribution. A copy of the Index will be mailed, without charge, to all individuals requesting it on their letterhead. Address your request for the 1945 DIESEL PROGRESS Editorial Index to DIESEL PROGRESS, 2 West 45th Street, New York 19.

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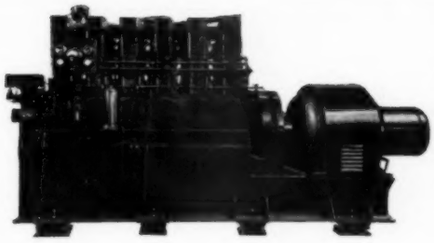

Korfund Type SK Combined-Check and Vibration Isolators of this Diesel installation give special protection against lateral motion of the engine under conditions such as in rough weather aboard ship, in addition to preventing transmission of vibration to the sub-structure.

Wherever vibration is uncontrolled, it is dangerous to the installation and to the foundation. Korfund offers the engineering skill acquired over forty years' experience in Vibration Isolation... to solve your vibration problems. There's more than one way to control vibration... and Korfund can recommend the right way for you. Write for complete information today.

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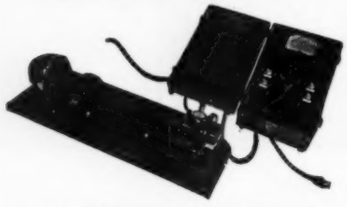

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William Carter Dickerman

WILLIAM CARTER DICKERMAN, long a business, civic and cultural leader of New York and East Hampton, L. I., died April 25. He was born at Bethlehem, Pa., 71 years ago.

William Carter Dickerman

A resident of New York since 1900, Mr. Dickerman was a descendant of a Colonial family which settled first in Dorchester, Mass., in 1638. The family migrated to Connecticut and then to Harford, Pa. Mr. Dickerman's early home was in Milton, Pa., and he attended Penn Charter School in Philadelphia and Lehigh University, Bethlehem, Pa.

For 50 years Mr. Dickerman was active in the railroad equipment field. In 1929 Mr. Dickerman became president and in 1940 chairman of the American Locomotive Company. After serving through the war years at the request of the Board of Directors, he resigned as chairman of the Board immediately after the war, remaining, however, as a member of the Executive Committee and of the Board.

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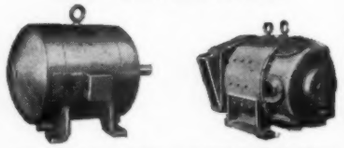

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* The Osborne Principle is an exclusive design that positively overcomes piston and cylinder lubrication problems, piston rocking or slapping, and abnormal cylinder wall wear.
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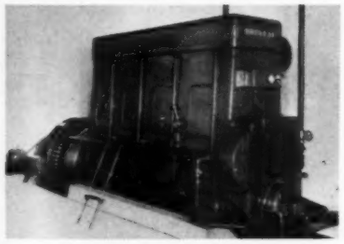

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375 HP	Alco	6 cyl.	372 KVA	3/60/240	1930
875 HP	Fairbanks	6 cyl.	300 KVA	3/60/2400	1936
300 HP	Fairbanks	6 cyl.	300 KVA	3/60/2400	1935
550 HP	G. M. Winton	6 cyl.	285 KVA	3/60/240	1937
280 HP	Buckeye	6 cyl.	210 KVA	3/60/2300	1939
225 HP	Buckeye	6 cyl.	150 KVA	3/60/480	1941
187 HP	Buckeye	6 cyl.	150 KVA	3/60/240	1937
160 HP	Buckeye	6 cyl.	107 KVA	3/60/2300	1931
150 HP	Buckeye	6 cyl.	125 KVA	3/60/480	1939
110 HP	Buckeye	4 cyl.	84 KVA	3/60/240	1939

Running Inspection by Appointment.

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CHECK YOUR FUEL SUPPLY AT A GLANCE

THE LIQUIDOMETER CORP.
36-24 Skillman Ave., Long Island City, N.Y.

WEST COAST DIESEL NEWS

By FRED M. BURT

CAPT. Ralph Horne's new 76 ft. fishing vessel, *Kiska*, designed by Adolph Lindstrom and built by the Columbia River Packers Assn., is powered with a Fairbanks-Morse Diesel engine, 240 hp. at 400 rpm. The two auxiliaries are Caterpillar Diesels.

THE tuna clipper *Bernadette*, fishing for Westgate Sea Products Co., San Diego, has an 840 hp. 6 cyl. Union Diesel for propulsion power. This 144 ft. vessel requires auxiliary power for a large variety of equipment, using two 200 hp., 6 cyl. Union Diesels, direct-connected to 125 kw. General Electric D.C. generators. There is also a 75 hp. Caterpillar Diesel standby driving a 30 kw. generator.

DESIGNED by E. Bruce Newby, Long Beach naval architect, two steel tuna clippers are being built at the Avondale Marine Ways, New Orleans, for San Diego owners. The *Paramount* will be driven by a Superior Diesel, 1,120 hp. 8 cyl. Auxiliaries will be two 225 hp. Chicago Pneumatic Diesels directed-connected to 125 kw. generators. The second clipper of the same size will have an 840 hp. Superior Diesel and Superior auxiliaries.

THE 86 ft. power scow, recently purchased from the government by The Farwest Fishermen, Inc. at Anacortes, is being adapted for fish-carrying, with twin Caterpillar Diesels to give a speed over 9 knots.

SPACE SAVER!

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All In One Compact Package!

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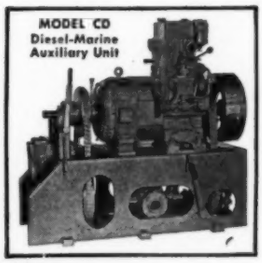
Diesel-Marine Auxiliary Unit



ENGINE—8 h.p.
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AIR COMPRESSOR—11 or 20 c.f.m.
PUMP—60 or 90 g.p.m. at 60#.
Net Weight—1,400 lbs.
Many other combinations and Diesel-Generator sets available, up to 10 kw.

WRITE FOR BULLETIN 151
Desirable territories open for factory representatives.

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HOLD **COMPRESSION** WITH THE **AUTO-DIESEL** *Helicam* **GAPLESS** PISTON RING

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It's a big improvement over conventional rings. Two IDENTICAL interlocking parts form a really gapless ring . . . positively ends blow bys . . . holds even heaviest compression. Has the tension, flatness, circularity and close dimensional limits needed for maximum performance. Sizes from 1" to 36" . . . for original equipment or replacement in Diesel units, and for pneumatic and hydraulic equipment. Used also as oil rings . . . contracting rings for sealing shafts, bearings, etc.

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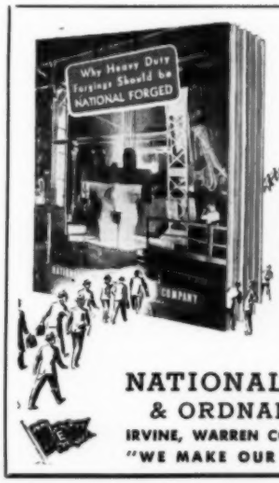

IF YOU CAN'T GO THROUGH THE PLANT, BE SURE YOU GO THROUGH THIS BOOK. WRITE FOR YOUR COPY.

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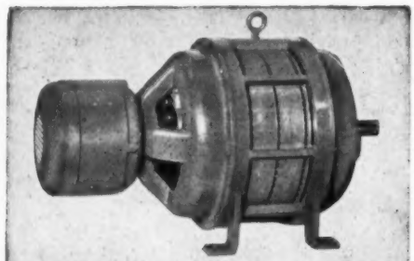

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D.C. UNITS range from 7½ to 200 KW.
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THE new Alaska halibut fishing vessel, *Cross Sound*, Monk-designed, Everett-built is powered with a Caterpillar 115 hp. Diesel, with an electric starting system operating from a 110 volt D.C. power supply.

SEVENTY foot steel tuna clipper, *Pico*, owned and built by National Iron Wks., San Diego, is driven by a 200 hp. Lorimer Diesel with two 60 hp. Lorimers for auxiliaries. Refrigeration for 75 tons has two 3½ x 3½, 4 cyl. Baker compressors.

TUNA clipper, 149 ft. *Queen Mary*, Capt. Fernando Medina, has just returned from war service to rejoin the San Diego fleet. She is propelled by an 800 hp. 8 cyl. Union Diesel; auxiliaries consist of two 130 hp., 6 cyl. Union Diesels driving 100 kw. G.E. generators.

THE *Sportfisher II*, combination dragger, built in Seattle, Monk-designed for Milt Pellegrini, is 50½ ft. over-all and powered with a 150 hp. Cummins Diesel.

FILLING the position held by the late Fred Jervis, George Castera has been elected to the presidency of Bardco Manufacturing and Sales Co. of Los Angeles. Sidney Wyse is Vice Pres.-General Manager and John E. Walters is Vice Pres.-Sales Manager. Bardco is building a wide range of gasoline and Diesel engine-driven lighting plants, as well as electric motors and generators.

THE Sausalito (Calif.) Boat Works is building a 38 ft. combination boat for Tony Ferrante, Monterey fisherman, to be powered with a 225 hp. Gray Diesel.

ALTHOUGH it will be built by Bath Iron Works of Maine, the 16 knot, 167 ft. yacht designed by John H. Wells, Inc. for Major Max Fleischman, will be propelled by two Diesel engines developing 900 shp. at 500 rpm.

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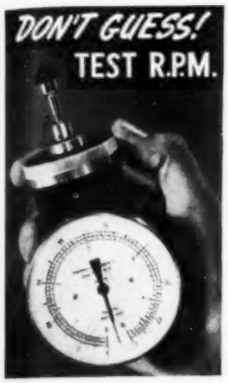

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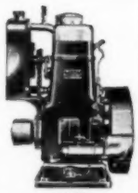

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THE steel tuna clipper *White Star*, 138 ft. x 32 ft., 475 tons capacity, the new Van Camp Sea Food Co., flagship, is equipped with a 1200 hp. Enterprise Diesel to cruise at 12½ knots.

POWERED with two 7 cyl. Kockum-M.A.N. single acting Diesels providing 8,000 hp. for a 16½ knot speed, the *Bio Bio*, newest Diesel ship of the Johnson line, recently arrived on the West Coast with a Scandinavian cargo.

PACIFIC Boat Building Co., in its Tacoma, Wash., yard, has a 77 ft. trawler under construction to be powered with a 240 hp. Washington Diesel.

A BUDA Diesel engine rated for 171 hp. at 900 rpm. was chosen to repower the 45 ft. Olsen Tugboat Company's Tacoma tug *Magnolia*.

USING Eskimo labor, a river trading boat 64 ft. x 15 ft., drawing 18 inches, and powered with a 4 cyl. General Motors Diesel engine, will be built on the Yukon by Axel Alstrom for the Bering Trading Co.

SEVEN 112 ft. Canadian Navy Fair-miles are being re-modeled to be used in charter service as luxurious Diesel yachts; operated on the West Coast by Hamiltair, Ltd. The first one has been re-powered with two General Motors, Gray 225 hp. engines to give a 14 knot speed.

TWO General Motors Diesels, each developing 200 hp., supplied through Gunderson Engineering Co., Portland, Ore., will be used to propel a new 75 ft. yacht being built by the Grandy Boat Co., of Seattle, for Charles W. Myers of Portland.

CHARLES R. "Chuck" Evans, junior member of the Evans Engine & Equipment Co., of Seattle, distributors of General Motors Diesels, is back after 3½ years of Naval service, which included service as Diesel technician on the staff of Admiral Lord Louis Mountbatten.

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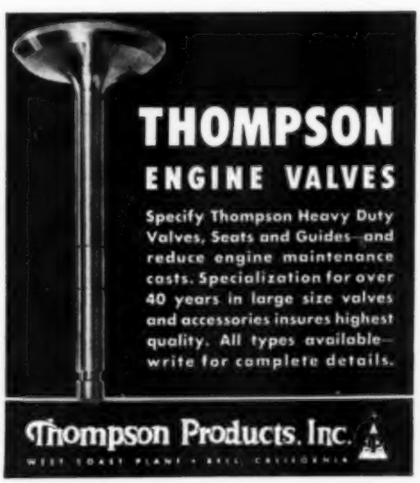

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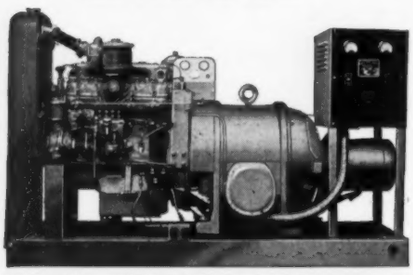

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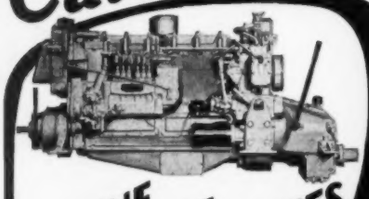

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